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THE UNIVERSITY OF ALBERTA

CREATIVITY, COOPERATION AND GRADUATION



JEAN-PAUL LEBLANC

TO MY WIFE, NATHALIE  
WHOSE COOPERATION IN  
PRODUCING THIS THESIS  
WAS INVALUABLE

DEPARTMENT OF EDUCATION

EDMONTON, ALBERTA

SPRING, 1972



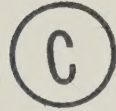




THE UNIVERSITY OF ALBERTA

CREATIVITY, DOGMATISM AND GRADES

by



JEAN-MARC LEMIRE

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH  
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## ABSTRACT

In a sample of sixty-two (62) junior high school students (of average I.Q.) selected from two schools and involving six classrooms, a substantial negative relationship between most of the four dimensions of creativity (fluency, flexibility, originality and elaboration) as measured by the Torrance Tests of Creative Thinking, and teachers' grades (in mathematics, social studies and science) was found when each classroom and each course were considered. It was hypothesized that 1) a negative relationship between creativity and grades would occur when the teachers are highly dogmatic and 2) that a positive relationship would occur when teachers are low on the Rokeach dogmatism scale. The hypotheses were not supported by the data. On the contrary, when creativity referred to fluency and flexibility, a very low negative relationship corresponded to the high dogmatic teachers, while a substantial negative relationship corresponded to the low dogmatic teachers. The findings obtained suggest that one cannot state the above hypotheses without considering the educational ideology of the teachers and the 'progressive' context of the school's rules and values.





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# C H A P T E R   I

## INTRODUCTION



## INTRODUCTION

This thesis was initiated on the basis of the author's concern for the functioning of society and the management of its resources. This concern, viewed as a 'social problem', is presented in somewhat general terms in the second chapter.

In the context of this concern, a specific problem involving the relationship of creativity and school is isolated in the third chapter. In it, basic terms are defined and hypotheses are developed.

The fourth chapter shows the design of a study conducted by the author in order to demonstrate the plausibility of his hypotheses. It includes such items as the method of selecting the study subjects and the validity of the instruments of measurement used.

Chapter five shows the nature of the data gathered and the ways in which the author analyzed them. It shows the extent to which the hypotheses elaborated in the third chapter were demonstrated.

In the final chapter, the content of the thesis is summarized and conclusions regarding the nature of the analysis of the study findings are drawn. These conclusions relate the study findings to other findings and suggest some steps to undertake in future studies of the same nature.





C H A P T E R    I I

CREATIVITY AND SCHOOL:    A SOCIAL PROBLEM





## CREATIVITY AND SCHOOL: A SOCIAL PROBLEM

The term 'creativity', as used in this chapter will refer to various related terms, such as 'curiosity', 'originality', 'problem-solving ability', etc., and the term 'school' will refer to the actual system (last twenty years), all grades including University (unless specified). The presentation will be in somewhat general terms, in order to suggest the same general feeling which motivated the author to undertake the study which follows this chapter.

The problem implied in the functional relationship of creativity and the school system can be stated as a syllogism.

Premise 1. Certain basic characteristics of the school system do not favour the development of creative students and even discourage it.

Premise 2. Since the school system is a major means of accessibility to responsible and/or powerful social positions or occupations, then...

Conclusion: few persons in responsible and/or powerful social positions are as creative as they could be (if the school system was changed so as to admit or encourage creative talent). This conclusion also implies that less problems which require creative talent are being solved, and that society's efficiency of operation is less than maximum<sup>1</sup>.

In the following, each premise as well as the conclusion is examined on the basis of available data. Despite the unavailability of survey data on the 'outputs' as well as on the quality of the school

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<sup>1</sup>One interesting corollary is that many creative students will not have the opportunity of access to positions of power and consequently, might contest such positions through anti-social actions. Studies reported by Foster (1968) and Anderson (1968) suggest this possibility.



system (Baldwin, 1965; Cameron, 1959; Cohen, 1969; Enns, 1969; Keppel, 1966; Ingram, West, 1971), the exploratory and experimental data provided generally coincide and permit an image of the school system.

## I. FIRST PREMISE

This first premise refers to the characteristics of the school, the characteristics of creative students and the dysfunction of the relationship between these two entities.

### A. Characteristics of the School System:

According to Johnson (1968), any educational program embraces four areas: goals, curriculum, instruction and evaluation. For the purpose of our demonstration three of these four elements appear most relevant: Instruction, Curriculum and Evaluation<sup>2</sup>.

#### a) Instruction:

Since instruction essentially involves a relation between teacher and student, any reference to this relationship should include a consideration of the teacher's performance (Geer, 1968).

This relationship was particularly under scrutiny in the 20's and 30's when the so-called Progressive Education Movement criticized the various aspects of formal discipline in the classroom, the lack of interest in the student and the authoritarianism of the teachers (Cremin, 1961).

---

<sup>2</sup> This classification coincides with Taylor's 3-dimensional model for analyzing educational programs: Teaching Methods; Subject Matters and Student's Thought Processes (Taylor et al, 1962).





Unfortunately, according to some, reports in the 40's and 50's indicated that few changes had occurred. In 1958, Dr. Swift, Alberta Deputy Minister of Education, indicated that the school system was not being "shaped or significantly influenced, at least overtly enough to be readily observed, by any particular set of philosophical considerations" (Swift, 1968:30). Earlier, Prof. A.S. Mowat of Dalhousie stated that, in his views, the Canadian school system had been "little affected by Progressive Methods" when compared to the U.S.A. (Mowat, 1954:26). On the other hand, American studies of the 60's report very traditional attitudes towards the methods of instruction.

In his extensive review of the research literature on teachers' performance in classroom, Biddle (1969) concludes: "These observations point to a classroom that is 'traditional' in its orientations... the teacher of today has been little affected by a progressive ideology on the concepts of an activity-centered education". Bellack (1963) found that the direction of the relationship teacher-student was primarily from the teacher to the student and usually originated from the teacher. In a study of 41 elementary school teachers, Hughes (1959) concluded that: "Generally, classrooms are predominantly controlled by dominative teacher behavior". In a study of 100 social studies classrooms, Flanders (1959) found that: "The teacher tends to dominate interaction by the use of direct influence with a resultant reduction in student participation".



Similar conclusions were reached by Pugh (1967:635) and Friedenbergr (1963).

One might describe the present instructional practices as traditional, teacher-oriented or dogmatic, despite some trends towards the use of discovery methods (Johnson, F., 1968:140) which, as explained by Bruner (1961:20-22) and Taba (1963: 310-315), emphasize the role of the student in his education.

b) Curriculum:

During the Progressive Education era, the structure and the content of the curriculum were to be centered around the child and the individual. The curriculum was to be set up on the basis of principles promoted by such people as Rousseau, Froebel, James, Dewey, etc. (Brubacher, 1966:286-294).

However, under the criticisms of what appeared to be anarchy in the school system (Lower, 1956:12-13), lack of consideration for social needs (Wild, 1955) and lack of consideration for the logical structures of certain fields of knowledge (Bruner, 1951: 17-32; Johnson, F., 1968:148), "a heightened interest, almost hysterical in some quarters, in the formal content of education" was noted by Swift (1958). For example, although the system of elective courses had won public acceptance in the U.S.

(Cordasco, 1963:130) and in Canada (Putman, 1925:112-115), core subjects were still seen as a necessity (Conant, 1959:47).

One might describe the curriculum of the last five years as semi-rigid (i.e., includes elective and core courses) and





logical (versus psychological). However, referring to the patterns of curriculum in America for the last 20 years, Connell et al (1962) characterized the most widespread form as: pre-planned subject-matters and neglect of learners' interests and critical thinking. Parsons (1959), Schellenberg (1965) and Horton et al (1955) also used similar terms to describe their observations.

c) Teacher's Grades:

Until very recently, the grading and examination systems were very much interrelated. As illustrated by Brubacher (1966: 376): "Written examinations were the gates between grades, and these gates swung open and shut in a scheme of annual promotions". Despite early criticisms (Eliot, 1898:151-176, 253-269) of a system which "suppressed rather than took account of individual differences", the intimate relationship between grades and marks was only eliminated in the 60's in Canada (Morrison, 1931:81; Johnson, F., 1968:107). The so-called "non-graded school" or "continuous progress" system was introduced in Saskatchewan only in 1964, in Quebec in 1965 and in New Brunswick in 1966 (Stevenson, 1970:490; Johnson, F., 1968:138). On the other hand, the middle-age system of examination referred to as the "recitation" (Brubacher, 1966:188) has not undergone much change. Among the seven general Royal



Commissions on Education of the 50's and 60's<sup>3</sup>, only one (the Hall-Dennis Commission) made definite recommendations for the abolition of the contemporary examination system (Stevenson, 1970:484) at the elementary and secondary school levels. The characteristics of these examinations have been described in many instances.

Considering the examination process, Bloom (1956) clearly stated that: "The most cursory reading of the standardized test available or of teacher-made tests would indicate [that] a tremendous emphasis is given in our schools to remembering or recall". Torrance (1962) found a similar characteristic of the examination system in his "survey sample of the status of high school objectives". On a 100 point scale, cognitive and memory objectives accounted for 76 points and convergent thinking (right attitude, right solution...) accounted for 18.7 points, leaving 5.3 points for evaluative (comparing, judging...) and divergent thinking (independent, constructive). In view of these data, one might describe the present marking system as still emphasizing information storage and retrieval, i.e. memory, rather than emphasizing information manipulation, i.e. mental skills.

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<sup>3</sup> Ontario's Hope Commission (1950); Ontario's Hall-Dennis Commission (1968); Manitoba's McFarlane Commission (1959); Alberta's Cameron Commission (1959); B.C.'s Chant Commission (1960); New Brunswick's Byrne Commission (1963); Quebec's Parent Commission (1963-66) and Newfoundland's Warren Commission (1967-68).



B. Characteristics of Creative Persons:

The emotional, personality and cognitive characteristics of so-called creative people have been investigated at various occasions during the last twenty years. Among these investigations, perhaps the most comprehensive are those of Torrance (1962), Guilford (1967), Wallach and Kogan (1965), Getzels and Jackson (1962), and Barron (1961).

These studies characterize the mental abilities of the creative person through: curiosity, originality, etc. They characterize the attitudes and/or personality traits as: humour, playfulness, lack of rigidity, relaxation, inventiveness, independence of judgement, personal complexity, self-assertion, need for personal mastery over experience, rejection of suppression as a mechanism for the control of impulse, and rejection of regulations by others. Although the studies which attempted to differentiate the creative person on the basis of personality characteristics are often contradictory (Foster, 1968), there is a consensus in terms of his mental abilities (Guilford, 1967:137-170). In fact, the creative person is the one who scores the highest on the thought products referred to as "divergent production". Divergent production can, according to Guilford and Torrance, be subdivided into four major mental operations referred to as: fluency, flexibility, originality and elaboration. Fluency refers to the ready flow of ideas conceptualized in terms of units, relations and systems. Flexibility refers to the readiness to change the direction of information:





this mental operation produces concepts of 'classes'. Originality refers to the readiness to modify information: this mental operation produces the concepts of 'transformation'. Finally, elaboration refers to filling out ideas with details: this produces concepts of 'implication'.

C. Inconsistency of the Creativity-School Relationship:

Given the above data, it is inferred that the amount of conformism stressed by both the teacher-student relationship and the curriculum pattern is incongruent with the creative student personality traits and, that the emphasis of the examination process on memory and cognitive abilities might unduly penalize the creative student. These conclusions have been well supported through the experiment reported by Hutchinson (1967:419-427). Using a sample of 256 students, he found that "in the typical seventh grade social studies classroom using current teaching practices, verbal responses of the students are found primarily in the cognitive-memory classification, and productive thinking is primarily convergent"; "modifying instructional procedures... so as to treat students as thinkers rather than only as learners, elicits wider range of verbal responses" (divergent and evaluative thinking categories) and "make no difference in measured growth of the subject-matter knowledge between the current and experimental teaching practices... as... three of the four experimental groups [with modified instructions] not only showed no loss but actually showed greater growth than the control groups". Hutchinson also reported that the students in the 4 experimental groups [compared with 4 control groups] showed a significant difference on 4 of the 10 measures of



creativity, after the teachers and students were trained 4 days prior to the 15 days of experimental education, whereas the "control groups had no significant gains over the experimental groups". If the basic conditions of creativity are compared with the normal conditions of the school system, it is apparent that they are in disagreement with each other. Reviewing the related literature, Alamsah (1967:305-313) reduced the necessary conditions of creativity to four types: Motivation; Self-limitation; Receptivity and Competence. The first two conditions appear in flagrant contradiction with the present system as they refer consecutively to a "pull" effect which proceeds from the environment and to the individual's recognition of his talents and abilities and of his personal value system. In the above-described system, which is teacher-oriented and which emphasizes conformism and obedience, there is little to suggest that the system attempts to encourage the individual to create and to recognize his own ability through some kind of experience. The third condition is defined by Alamsah as openness to new ideas or viewpoints. In examining the school system one can hardly argue that it promotes new ideas, since it is in itself a quite rigid and closed system. The fourth condition described by Alamsah is perhaps the only one which is consistent with the creative student characteristics. Referred to as competence or knowledge or mastery of the tools for intellectual work, this condition certainly coincides with the curriculum characteristics of the school system.





These inconsistencies between the creative student characteristics and the characteristics of the school system are further supported by the following finding. Pang's (1968) socio-historical survey revealed that Davy, Newton, Darwin, Comte, Locke, Edison, Pasteur, Watson, Fermi, Curie, Faraday, Einstein, Hobbes, Linton, Durkheim, Poincarre, etc., either nurtured a strong antipathy toward the school system or performed poorly.

If we agree with Polya, Rossman and others (National Bureau of Economic Research, 1962) that interest and motivation are crucial factors of invention or of creativity, the present data on the rate and the nature of underachievers and of drop-outs in our schools should be viewed as an indication of the possibility of an incongruence between the school system and the creative student's desires and aptitudes.

In 1960, Seeman (1960) reported that underachievers (under the average) were "significantly characterized and differentiated by the manifest needs for dominance (unwillingness to conform to the demands of the school situation) and for affiliation (greater interest and concern for social activity than for studies)".

After a review of the literature on this aspect, he concluded that one-third of students of higher education can be considered "under-achievers". Recently, an analysis of drop-outs of the Edmonton Public Senior High Schools (Paterson, 1968) found that two of the three main reasons for dropping out were lack of interest in school work (17.8%) and attendance problems (11.7%). Only 4.9% indicated



"academic difficulties" as a reason. The total number of drop-outs for the period studied, September through December 1967, was reported to be 930. The reasons given by the drop-outs were among 18 "suggested by the school". At a more advanced level, Harvie (1969) found, among a representative sample of university undergraduates (University of Alberta) and a representative sample of students from an institute of technology (Northern Alberta Institute of Technology) who dropped out in 1967-68, that "lack of interest in courses" was the most frequent reason mentioned and accounted for 23.7% of the cases. The total drop-out population that year was more than 1,000.

Despite this bleak view of the school system a general consideration should be kept in mind: not all creative students are penalized or suffer from the school-creativity incongruency. As will be noted later, in our review of the research literature, the students with above average I.Q. usually adapt well to the school situation. Moreover, evidence shows<sup>4</sup> that many creative individuals succeed in satisfying the school system's requirements.

## II. SECOND PREMISE

This premise refers essentially to the nature of the school system as a major means of accessibility to 'powerful' social occupations.

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<sup>4</sup>Studies by Orowan (1959) and Deutsch et al (1971) show that despite the various obstacles to creativity in the school, 'academics' remain a major category of inventive individuals.



A series of changes in the societies of the 17th, 18th and 19th centuries brought about a school system which became a means of access to 'significant' social positions. The 'scientific revolution', the 'industrial revolution' and the 'political revolution' are the main recognized elements of Western civilization which introduced an organized system of thought referred to as 'liberalism', which promoted the access of all classes of individuals to the same basic education (Bruun, Commager, 1954:428-444; Stavrianos, 1966:185-240). Graves (1913:1) summarizes this historical context as follows: "In the eighteenth century are found the climax of the rebellion against the arbitrary authority of church and state, and the period of extreme individualism".

Charity and philanthropic schools such as those promoted by the "Society for the Promotion of Christian Knowledge" in England, those promoted by the "Brothers of the Christian Doctrine" in France and those promoted by the "Society for the Propagation of the Gospel" in America, etc., had initiated, during the 16th and 17th centuries, a trend towards universal education which cumulated into a system of public schools by the 18th century (Boyd, 1932:297-300; Graves, 1913:295-306). In Canada, public schools were first introduced in Ontario in 1871 (Graves, 1913:312).

Many thinkers of the 17th and 18th centuries perceived the threatening impact of universal schooling on class structure and on the distribution of power and wealth. Mandeville, for example, stated that "to make the society happy and people easy under the meanest circumstances, it is requisite that great numbers of them should be ignorant





as well as poor..." (Brubacher, 1966:85). Similarly, Diderot affirmed that rigorous high academic standards should be applied in order "to temper the ambition of parents who are desirous of withdrawing their children from the subordinate occupations which they themselves follow, and of having them educated for priesthood, medicine or law. Nothing is more fatal to society than this disdain of parents for their own calling and these senseless migrations from one state in life to another" (La Fontainerie, 1932:300).

Today, formal education is still a necessary prerequisite for admission to most of the more powerful social occupations. The finding by Warner and Abegglen (1955:140-141) that there is an inverse relationship between the educational attainments of executives in an industry and the rate of growth of that industry recently suggested to Lenski (1966:393) that educational achievement was considered a symbol of membership in a favored class whose members are more concerned with the advancement of their personal and class interests than with the firm involved. Eckland's survey (1965:735-746) shows that when father's occupation and student's intelligence were controlled, formal educational attainment explained the concentration of the graduates in high status jobs, while those who were not graduates were in low status and middle status occupations. Similarly, when Porter (1961:486, 492) defined the Canadian Economic Elite as consisting of 985 people "who could be considered the most influential industrial and commercial leaders in Canada", it was found that the majority (56%) had university education.



More recent data support the same conclusion. On the basis of longitudinal study findings, Sewell et al (1970) concluded that educational status attainment appears to have a "substantial impact on early occupational status attainment". On the basis of 1968 data, Spaeth (1970) found that the strongest predictive academic variable to the prestige of the job held was attendance at graduate school. Blau and Duncan (1967:157) went even further when they concluded that "the proportion of men who experience some upward mobility increases steadily with education from a low of 12% for those reporting no schooling to a high of 76% for those who have gone beyond college". As Dreeben (1971:82-119) partly explained, because society becomes more industrialized and automated, a higher level of occupational specialization is needed and such skills can hardly be developed, at present, without the school system.

Whether it is competence gained through appropriate training or authority gained through the 'masses' conviction "that the performance of the occupational skill requires specialized education; that those who possess this education, in contrast to those who do not, deliver a superior service" (Greenwood, 1962:211-212), the fact remains that education is a key to social powers and privileges which, in addition, bring other powers and privileges (Nosow, Form, 1962:373-375).





### III. CONCLUSION

If one accepts the two above premises, the conclusion seems obvious: many creative individuals who could hold responsible and powerful positions will not do so, due, in part, to the school system. The consequence of this fact, in the functioning of society, is apparent: less problems will be solved, or they will not be solved as creatively as they could be.

The necessity for the individual, as well as for society, to develop creative talent and to use it has been stressed in various ways in the last twenty years. After reviewing historical records, Torrance (1962) concluded that cultures had collapsed because of the failure to utilize "intelligent, imaginative methods for solving... problems". Similarly, Hagen (1962:30-35) concluded in his examination of social change through the centuries that as "technological advance requires doing new things, it requires also the creation of new economic, political and social organizations and relationships or the adaptation to new functions of old organizations and relationships". In regard to human relationships, Coleman explains "... in our work, in our relationships with other people, in our role as citizens, we must use our full intellectual capacities to analyze the problems we encounter and work out the best solutions. Indeed, even some of the problems for which we do have habitual solutions merit a more thoughtful approach than we gave them, for our habitual ways of seeing and doing things can be outmoded with changes in circumstances and in ourselves" (Coleman, 1960: 377). In fact, research suggests that in order to solve the numerous



problems presented daily through interpersonal behavior, the individual must use at least six types (units, classes, relations, systems, transformations, and implications) of creative abilities (Guilford et al, 1968:155-164).

In discussing the nature of scientific discoveries, the notion of 'creativity' is stressed in more than one instance by natural scientists such as Carnap (1966) and Flanagan (1959), as well as by behavioral scientists such as MacIver (1942) and Kaplan (1964). They agree with Einstein and Infeld that "to raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination..." (Einstein, Infeld, 1938:95).

Concerned over the "changing demands of the society" and the "supply of talent", a U.S. Committee on the Identification of Talent was created in 1951, with its first aim being: the research on "non-academic" types of talented behavior (McLelland et al, 1958). Later, in 1958, the Rockefeller Commission on Education frankly concluded: "It is tempting to treat the problem of highly trained manpower in terms of the specific shortages which occur from time to time. But the true difficulty lies deeper. It is not a shortage, now of engineers, now of economists, that lies at the root of the problem. It is the constant pressure of an ever more complex society against the total creative capacity of its people" (italics in the text) (Rockefeller Brothers Fund, 1958).

Referring to a "crisis of intellectual poverty" and a "knowledge problem", Cohen (1969) and Clark (1969) emphasized the need to develop



the creative talent and to revise the whole educational process in terms of individuality, mobility and flexibility. It is not simply a coincidence that the recommendations of the Hall-Dennis Report on Education in Ontario (Hall,Dennis, 1968) included the following four points:

- 1) "Emphasize the creative nature of the learning process through methods of discovery, exploration, and inquiry" (Recommendation 19);
- 2) "Provide learning experiences which are pertinent to the personal needs and interests of the learner" (Recommendation 20);
- 3) "Provide learning experiences that permit students to use content as a tool for discovery and exploration" (Recommendation 21);
- 4) "Develop skills in research, organization and deduction throughout the learning program" (Recommendation 22).

Similarly, the Parent Commission in Quebec (1963-66) recommended that "teaching was to aim at individualized instruction, overall development of the child, and the stimulation of creativity among the students" (Stevenson, 1970:476).

Formal education being a key to privileged social positions and to social power, it is crucial for society's functioning that the school system be modified so as to encourage those individuals with "divergent" mental abilities (creativity). This recommendation is suggested by various studies of the school system and by studies regarding the nature of social functioning.





C H A P T E R    I I I

CREATIVITY AND SCHOOL:    A RESEARCH PROBLEM



## CREATIVITY AND SCHOOL: A RESEARCH PROBLEM

The second chapter attempted to demonstrate how the encouragement or discouragement of creativity in the school can have an impact on society's functioning or the solution of its problems. In a very general manner, it was concluded that students' creativity is not congruent with the school system and consequently that the school system is, to a certain extent, dysfunctional (meaning here that the best approach is not used) within society. This chapter aims at providing the basic concepts which have been used in a study of the conditions under which creativity is encouraged or discouraged in school. This study was planned in order to give directions for the improvement of the function of school systems in our society.

In this chapter, we intend to (1) specify or operationalize the two major concepts which are of concern here: students' creativity and school; (2) review the research literature regarding the relationship between these two concepts and (3) formulate our research problem into an hypothesis to be tested.

### I. SCHOOL

Although many characteristics of the school system have been presented in the second chapter, not all these variables can be examined (due to the funds available for the study planned). However, in order to examine the possible dysfunction of creativity and school under certain conditions, some necessary elements of the school system must be isolated. The two elements which seem most promising are teachers and grades (marks). A brief reexamination of these two concepts is



provided below.

#### A. Teachers

The teacher is an element of the school which is directly related to the method of instruction and to the curriculum. The influence of the teacher on the mental and behavioral functioning of students can be assessed in various ways. The teacher can utilize various means to render a lecture more or less interesting, he can select from an area of content those elements which might most interest the students, he can relate to the students with a more or less personal manner and he can apply the rules of the system with more or less rigor and with more or less explanations (Getzels, Jackson, 1963:506-582; Withall, Lewis, 1963:683-714; Ryans, 1960).

The basic role of the teacher in the school system has been recognized by Royal Commissions in Canada: "The teacher is the key-stone of the educational arch: in the final analysis, the fulfillment of educational aims rests with him..." (Hope, 1950:564). "The quality of the school especially rests with him [the teacher], it is to a great extent his responsibility to safeguard and develop the basic principles of one cultural world and of our democratic system" (Parent, 1966).

#### B. Grades (marks)

It has been shown that a student's examination can be graded in different ways, depending on the teacher involved. Ross and Stanley (1954) have published an exhaustive review of the evidences of unreliability of school marks and examinations. And, a striking finding was made by Starch and Elliott (1913) concerning the essay type of exam.





They discovered that the grades given by 116 different teachers in a geometry examination (one of the 'exact' sciences) ranged from 28 to 92. In fact, in assigning grades to students, the teacher can manifest his own desires as to the student's abilities which he wants to see demonstrated and his own beliefs as to the student who "merits" one grade instead of another (Thorndike, 1969:759-760; Aiken, 1963:319-322).

Among the various measures of academic achievement (Horrock, Schoonover, 1968), grades refer to the system which permits the teacher to classify the student according to his own standard of competence and of success (Thorndike, 1969). This classification however, has a tremendous impact on the social future of the student as it is used by the labor market to select its manpower.

## II. CREATIVITY

The utilization of the term creativity is not new but its use seems to have become most popular in the recent years.

In his presidential address to the American Psychological Association (1950), Guilford (1960) observed that in the preceding two decades there had been 186 books or articles published on 'creativity'. On the other hand, it was recently reported (Getzels, Madaus, 1969) that the 1965 Psychological Abstracts listed 132 items under 'creativity'. Although 'creativity' has appeared in the subject index of the Psychological Abstracts as early as 1927 (Vol. 1), its popularity is now growing in other Abstracts. In 1957, 'creativity' first appeared in the Sociological Abstracts (Vol. 5); in 1960-61 it first appeared



in the Economic Abstracts (Vol. 8); and in 1964 it first appeared in the Management Index (Vol. 2).

Various attempts have been made to define creativity and to incorporate it into a psychological framework. Renner's (1966:139-162) review of the literature in this regard shows how the psychoanalytic theories of Freud, Brill, Abraham, Alexander, Bergler, Sachs, etc.; the ego psychology of Kris, Schaffer, Kubie; the psychology of Jung; the interpersonal psychology (emphasizing self and growth) of Goldstein, Allport, Adler, Fromm, Rogers, Maslow; the existential psychology of May, and the interpersonal psychology (emphasizing environmental interaction) of Tumin, Anderson, Moreno, Murphy, Mead (M.), Lasswell, Stein, all have emphasized the individual's personality according to the following viewpoints.

Creativity was seen as "an outcome of the individual's capacity to sublimate his pregenital sexual drives"; as "an outcome of his capacity to make restitution for destructive urges"; as "a result of achieving 'regression in the service of the ego'"; as "a consequence of animation of the archetype"; as "a result of drives of integration and competence"; as "self-actualization or growth"; as "depending on intense encounter with the world"; and as "depending on socially propitious human environment". Renner also indicated how the associationistic psychology of Ribot, Mednick, etc., the learning theories of Watson, the gestalt psychology of Koffka, Mooney, the trait psychology of Guilford, have all emphasized the cognitive factors of individuals. Other psychologists such as Barron, Gordon, etc., have emphasized



related approaches indicating among all that there are many definitions of 'creativity'.

For the purpose of our study the most useful definition is the one which can be operationalized. The above psychological theories have in fact suggested numerous approaches to measurement. These approaches can generally be divided into two categories: one which stresses the creative product or 'inventions' and one which stresses the creative person or ability (Taylor, 1964; Golann, 1963:548-565). Unfortunately, perhaps, the various definitions of creativity within each of these two general categories do not lead to only two methods of measurement, but to a variety of methods (Renner, 1966:164-168).

In this context of diversity, three factors led the author to select a particular definition. Firstly, there is the fact that the present school system emphasizes the cognitive elements of the individuals; secondly, the fact that the school context also emphasizes interpersonal relationships among individuals (particularly between the student and teacher) and thirdly, the fact that the two above-mentioned factors are incorporated into a definition of creativity which itself has been operationalized into a widely used instrument. These factors led the author to select Torrance's definition, which is as follows: "A process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on: identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results" (Torrance, 1966:6).





### III. CREATIVITY AND SCHOOL

If we understand the concept "school" as encompassing the elements of teachers' personality and teachers' grades, and "creativity" as students' abilities (as defined above), the research literature becomes more manageable and easier to analyze. The following examines the literature on the relation between students' creativity and grades and the relation between students' creativity and teachers.

#### A. Creativity and Grades

Our review of the literature dealing with these two concepts is particularly facilitated by Torrance's (1967) presentation of 114 coefficients of correlation based on experimentations carried out before 1967.

Table I indicates the various relationships (positive, negative and zero) between the Minnesota Tests of Creative Thinking (also known as the Torrance Tests of Creative Thinking) (Goldman, 1964) and Teachers' Grades. As may be observed, most correlations are positive. This means that the more creative a student was, the better his marks were. But a substantial amount of correlations (twenty-six), were found to be near .00 (-.10 to .10) and in 6 cases a negative correlation was found to be quite below (-.20 to -.39) the median (.21).

This situation suggests that a relationship between creativity and grades can be expected in most cases (studies), that it will be mainly a positive relation but that a negative or zero relationship may also be expected. On the other hand, the variance in the findings suggests that either the same variables were not taken into account in



TABLE I<sup>1</sup>

DISTRIBUTIONS OF PRODUCT-MOMENT  
COEFFICIENTS OF CORRELATION  
BETWEEN CREATIVE THINKING TEST SCORES  
AND TEACHER GRADES

<u>Coefficient of</u> <u>Correlation</u>	<u>Teacher Grades</u>	
	<u>Freq.</u>	<u>Cum. Freq.</u>
.70 or above	0	0
.60 to .69	1	1
.50 to .59	8	9
.40 to .49	11	19
.30 to .39	22	41
.20 to .29	21	62
.10 to .19	20	82
.00 to .10	18	100
-.01 to -.10	8	108
-.11 to -.19	0	108
-.20 to -.29	2	110
-.30 to -.39	4	114
Median	.21	

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<sup>1</sup>This table refers to a portion of Table II in Torrance (1967:149).



the studies at hand, that some significant variables were not always present during the experimentations or that the factors had various intensity.

In order to obtain indices as to the factors which could explain this variance in the findings, 10 studies were collected and examined in some detail (all of the related studies in the last 8 years of the Psychological Abstracts and the last 3 years of the Sociological Abstracts were reviewed).

Table II shows the main factors which seem to have been taken into account in the ten studies. Two of the studies (Merrifield, Hetrick and Mayhon) found no relationship between creativity and grades, two (Holland, 1961 and Edwards-Tyler, 1965) found a negative relationship and the remaining six revealed a positive relationship.

Again, the same comments as those made in regard to 'Torrance's variance' in coefficients of correlation can apply to the present variance: 1) not all of the variables were considered in all the studies; 2) some significant variables were not present during all the experimentations.

The first main factor reported in most (Holland, 1968a and Karsten, 1967 did not report this variable) of the studies at hand was the academic level of the sample. In this respect we can observe: that a zero relationship (Merrifield, Hetrick, 1968) coincided with a sample of elementary school children; that a positive relationship (Wilson, 1968), a zero relationship (Mayhon, 1966) and two negative relationships (Holland, 1961 and Edwards-Tyler, 1965) were found in





samples of junior high (grades 7, 8, 9) students; that one positive relationship (Tibbets, 1968) coincided with a sample of senior high students; finally, a positive relationship was found in two samples of undergraduates (Spautz, 1965; Fox, 1968).

A second factor considered in three of the studies is the combination (grouping) of bright and creative students in the testing procedures (Wilson, 1968; Holland, 1968a; Edwards-Tyler, 1965). Although a positive relationship was discovered in two cases, a negative one was found in the third case (Edwards Tyler, 1965).

A third factor which was reported in two cases (Karsten, 1967; Edwards-Tyler, 1965) is that of the average I.Q. level of the sample. Despite the fact that the two studies presented a similar I.Q. level (90 and 100, which represents an 'average level'), the type of relationship differed. At 90 (Karsten, 1967), the relationship was positive, while at 100 (Edwards-Tyler, 1965), the relationship was negative. These results suggest that when the I.Q. of the sample is at the 'average' level (around 90-100) a relationship can be expected but its direction can either be positive or negative. (It might be noted that this I.Q. measure includes a very wide range -- 63 to 133 in Karsten's study).

A fourth factor which was necessarily considered in each study was the measurement of creativity. In the 5 cases (Fox, 1968; Karsten, 1967; Tibbets, 1968; Edwards-Tyler, 1965; Mayhon, 1966) where only standardized tests of creative ability were used, contradictory relationships appear: in three cases, positive; in one case, negative and



TABLE II

CREATIVITY AND ACADEMIC ACHIEVEMENT (GRADES)

<u>STUDIES</u>	<u>SAMPLE</u>	<u>TESTING PROCEDURES</u>	<u>TESTS</u>	<u>RELATIONSHIP</u>
Edwards-Tyler 1965	181 Grade 9 students  Average I.Q.= 100	3 groups: I-highest third on SCAT; II-highest third on creativity; III-highest third on SCAT and creativity	G.P.A. (grades) M.T.C.T. (creativity)  SCAT (academic achievement)	Negative Relationship (Group III obtained lower marks than Group I)
Fox 1968	217 Junior College students		Risser, Metfessel G.T.O.C. (creativity)  G.P.A.	Positive Relationship (.17)
Holland 1961	994 National Merit finalists		Public competition, teachers' rating (creativity)  3 first years High School (grades)	Negative Relationship



TABLE II (cont'd)

<u>STUDIES</u>	<u>SAMPLE</u>	<u>TESTING PROCEDURES</u>	<u>TESTS</u>	<u>RELATIONSHIP</u>
Holland 1968a		3 groups: I-high I.Q., low creativity; II-low I.Q., high creativity; III-high I.Q., high creativity	Special test, teachers' rating (creativity)  School record (grades - assumed)	Relationship between Group I and III: positive on reading total, vocabulary, arithmetic fundamental  Group III - positive relationship on highest average except for reading
Karsten 1967	201, 13-year old Negroes, selective (150 cultural- ly deprived)  X I.Q.=89.5 Range=61-133 Median=88.6		Guilford (creativity)  G.P.A. (grades)	Positive Relation- ship (making objects, figure production, symbol production, object synthesis) No relationship (seeing problem utility)
Mayhon 1966	265 Grade 9 students		G.P.A. (4 subjects)  M.T.C.T. (creativity)	No Relationship





TABLE II (cont'd)

<u>STUDIES</u>	<u>SAMPLE</u>	<u>TESTING PROCEDURES</u>	<u>TESTS</u>	<u>RELATIONSHIP</u>
Merrifield, Hetrick 1968	196 Grade 4, 5, 6 students		Teacher rating (creativity) Gulamerian, Guilford-Hoefner (creativity) Grades	No Relationship
Spautz 1965	141 graduates		Teachers' ratings, publications, inventions (creativity) Upper division undergrad., Grad., lower division undergrad.(grades)	Positive Relation- ship on non-core course, elective (L.D.U.)  Positive Relation- ship on average (U.D.U.)
Tibbets 1968	258 Grade 10-12 students		G.P.A. M.T.C.T. and Getzels-Jackson (selected tests)	Slight but positive relationship
Wilson 1968	634 Grade 8 students	2 groups: I-high creative, high I.Q. II-low creative, low I.Q.	Students' ratings Teachers' ratings (creativity) (did not correlate)	Group I - Negative Relationship with low grades  Group II - Negative Relationship with high grades



in the last case, nil. It may also be observed that in the two cases (Wilson, 1968; Holland, 1968a) where only non-standardized tests (teachers' ratings, students' ratings, special tests presumably prepared for the occasion) were used, a positive relationship was discovered; that in the only case (Merrifield, Hetrick, 1968) where standardized and non-standardized tests (teachers' ratings) were (presumably) combined, a zero relationship was found. Finally, in the two cases (Holland, 1961; Spautz, 1965) where creativity was measured through non-standardized measures of ability and of achievement, the relationship was contradictory (negative, positive).

The fifth and last factor<sup>2</sup> considered in the studies of creativity-grades is the measurement of academic achievement. In this regard, either no information is available or the details provided are completely different from one study to another. This is particularly demonstrated in three reports (Wilson, 1968; Holland, 1961; Spautz, 1965). Wilson used both the school record and the report card for one year; Holland (1961) used all the marks for three years, and Spautz used selected grades of certain courses during certain years. Two of these three studies resulted in a negative relationship despite the different ways of measuring grades.

This last point leads us to a new dimension of the 'measurement of grades' as a factor which might explain the relationship creativity-

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<sup>2</sup>Despite the fact that we do not here compare or analyze the kind of creativity tests used, in regard to their validity and reliability, it is our intention to consider these essential elements in the next chapter.



grades. This factor is the involvement of more than one teacher in the assessment of examinations. It is interesting to note that none of the studies at hand (see Table II) seems to have considered this item.

#### B. Creativity and Teachers

Despite the small amount of data (known to the author) which are available in regard to the relationship between teachers and creative students, existing data tend to show that the teacher plays an effective role in encouraging or discouraging creativity in students. Moreover, additional data indicate how this might happen.

Miller (Mednick, 1963:583-596) found that certain types of teachers (highly dogmatic) gave lower grades to creative students, while other types (low dogmatic) gave higher grades. Referring to studies by Bowers, Bish and Bentley, where creativity was positively correlated with grades, Torrance (1967) explains that "it seemed to be attributed to the teachers' encouragement of creativity".

One dimension of the relation between creativity and teachers obviously refers to the question: Can the teachers improve or affect the creative abilities of their students? This question seems to be answered by the following findings. Firstly, a survey of the Stanford Research Institute revealed that, as a result of creativity classes conducted by more than 30 organizations in the U.S. (1968), thousands of dollars were saved, high percentages of improvement in products and processes were noted and a number of patent applications were made (Edwards, 1968). A series of highly controlled experiments conducted by Maltzman and Associates (Maltzman et al, 1963:287-310) simply showed





that originality can be learned by subjects if they have been conditioned to certain mental tasks.

Getzels and Jackson (1962) found that creative students negatively influenced the teachers in their preferences. Despite the fact that creative students had demonstrated a superior achievement on standard tests and that their academic scores were as good as those of highly intelligent students (low on creativity tests), the teachers involved "significantly preferred the highly intelligent to the highly creative students".

#### IV. FORMULATION OF THE RESEARCH PROBLEM

From the above studies regarding creative students, teachers' grades and teachers' personality, and additional related data, the following conclusions can be derived:

1. A significant relationship between creativity scores and grades can be expected in most experiments. This relationship is generally positive but a negative relationship may occur. This finding suggests that one or a series of factors might 'influence' a relationship to be either positive or negative.
2. Among junior high school students (levels 7, 8, 9), a negative relationship between creativity and grades can be observed. This finding coincides with the fact that at grades 7-8, children seem to attain a particular peak of imaginative ability (Arasteh, 1968). These findings suggest that a certain level of creativity must be attained in order to expect a negative relationship.



3. When the factor of "combination of high I.Q. and high and low creative students" is used, a positive relationship is usually obtained. This, in fact, is not too surprising since high I.Q. generally coincides with high grades (Yamamoto, Chimbois, 1966). On the other hand, when the I.Q. is average (around 100) a negative relationship is observed (Edwards-Tyler, 1965). These findings suggest that the I.Q. level might be a necessary factor in the direction of the relationship concerned. Moreover, although the factor of average I.Q. has, in the opinion of the author, never been very much stressed, a study by Wallach and Kogan (1965) indicates that the low I.Q.-highly creative student seems particularly sensitive to the academic environment in a way not noticed among high I.Q.-highly creative students.
4. Most of the instruments used to measure creativity have yielded a significant relationship. The only cases where it did not occur was when standard and non-standard tests were combined. This suggests that it might be a good precaution to use only one or the other type of test.
5. It was found that the same general methods of measuring academic achievement (grades) coincided with various results, suggesting that this factor is not crucial.
6. It was noted that few of the studies at hand had considered the factor of teachers' personality. However, from the limited amount of data available, it would appear that teachers' personality can play a significant role in creative students' grades, students'



products, i.e. inventions, and students' mental ability, i.e. originality. The finding most related to our 3 basic variables (creative students, teachers' grades and teachers' personality) is observed in the study by Miller which showed that highly dogmatic teachers tend to give lower grades to creative students than low dogmatic teachers. The explanation of this phenomenon could be that the low dogmatic teacher would be open to the new ideas and approaches of creative students while the highly dogmatic teachers would instead feel threatened in their status. On the other hand, the low dogmatic teacher would be more flexible in his corrections (grading) and would encourage creative answers as opposed to the dogmatic teacher who would be rigid and would tend to penalize the imaginative answer as an infraction to the rules. This reasoning is consistent with the Rokeach Theory of the Open-Mind (Rokeach, 1960) and with the findings of Wu (1968:176). Wu showed that not only were the low dogmatic student-teachers more original, synthetical and creative than the highly dogmatic, they were also more apt to ask questions involving such abilities as analysis, synthesis, evaluation, etc., which are consistent with Torrance's definition of creative thinking.

This last conclusion is precisely what the author is interested in in his study. Although the study envisaged appears to be a duplication of Miller's study, some elements differ. Firstly, Miller used the creativity test developed by Mednick, while the author used the test developed by Torrance; and secondly, Miller tested American





subjects while the author tested Canadian (Alberta) subjects (Mednick, 1963).

Since the above review of the related studies shows that there are various factors which might explain the results at hand, the best approach to use in our selection of the variables to consider is to control all of them. However, due to practical restrictions, it appears desirable to control two of these variables prior to the study so as to consider them only as conditions of the experiments. These two variables are the academic level and the I.Q. level. The nature of these two variables, i.e. level of academic achievement and I.Q. level, was determined according to their potentiality to yield both types of relationship (positive and negative) so as to leave to the experimental variables the possibility of determining the direction of the relationship. The experimental variables which remain are: grades, creativity scores and teachers' personality (dogmatism). Dogmatism was selected as a personality trait because it was most related to the relationship between creativity and grades and one which could be related to Miller's results.

These conclusions lead to the following conceptual hypotheses and the various implications that their testing yield for current as well as future research:

1. Conceptual hypotheses:

Among junior high school students of average I.Q., creativity and academic performance will be related:



- A. There should be a positive relationship between students' creativity and their teachers' grades if the teacher is low dogmatic, when the students are of average I.Q. and at junior high school level.
- B. There should be a negative relationship between students' creativity and their teachers' grades if the teacher is highly dogmatic, when the students are of average I.Q. and at junior high school level.

2. Research implications:

- A. Because the junior high school student population has already been used in other studies, the sample offers a direct basis for comparison.
- B. The age factor of this student category (sample) being between 12 and 16, it offers the possibility of relating the present hypothesis to studies of juvenile delinquency and drop-outs (from grade 9 particularly).
- C. This I.Q. range can easily be obtained in future experiments of the same type and most possibly refers to the average of the population at large.
- D. In view of the controversy about the relationship between creativity and I.Q., it is of prime importance to carefully register the sample's I.Q. level. In fact, although I.Q. is not recognized as highly related to creativity<sup>3</sup>, it is noted

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<sup>3</sup>Torrance presented a total of 178 coefficients of correlation between measures of intelligence and a total or composite measure of creative thinking (median was .20) (Torrance, 1967).



that at high I.Q. ("110-120+") the two abilities seem to add up in a way which is not noticed at lower I.Q. ("<110") levels (Yamamoto, 1964). Despite substantial efforts to account for this phenomenon, as yet, it seems impossible to formulate an explanation (Guilford, 1967).

- E. Most studies referred to the grade point average based on more than one course when they measured 'grades'. The disadvantage of such procedure is that it does not permit to isolate individual courses which are usually taught by different teachers. In this study, this factor is controlled.

The purpose of this chapter was to formulate a research problem related to the relationship between students' creativity and some elements of the school system. In order to limit the scope of this problem, a series of conceptual hypotheses were derived from the research literature. In the next chapter, these hypotheses are operationalized and a strategy to test these hypotheses is presented.





## CHAPTER IV

### RESEARCH DESIGN



## RESEARCH DESIGN

The research design refers to the general strategy which was followed in order to test the conceptual hypotheses derived from the research literature (chapter III). This research design can be divided into seven steps or phases, excluding the analysis of the data gathered. The analysis is presented in a separate chapter. The following sections refer to each of the phases:

- (1) Formulation of the operational hypothesis;
- (2) Selection of the research strategy;
- (3) Selection of the population or sample;
- (4) Selection of the instruments;
- (5) Descriptive nature of the instruments;
- (6) Validity and reliability of the instruments, and
- (7) Administration of the instruments.

### I. OPERATIONAL HYPOTHESIS

If we integrate the 3 conceptual hypotheses into one general hypothesis (to avoid repetition) and if we operationalize it, we obtain the following:

"In a sample of sixty-two (62) junior high students from 6 classrooms selected from 2 schools in Edmonton, where the students are of average I.Q., according to the Canadian Lorge-Thorndike I.Q. test, there will be a positive relationship between the creativity scores of the students, as measured by the Torrance Test of Creative Thinking, and the teachers' grades on selected courses,



when the teacher is rated low dogmatic according to the Rokeach Dogmatism Scale. On the other hand, a contrary relationship will be observed if the teacher is rated highly dogmatic. In addition, if the teacher's dogmatism is not taken into account, a relationship with unknown direction is expected between creativity and grades."

## II. SELECTION OF THE RESEARCH STRATEGY

Although the present study aims at determining a cause of low grades among creative students, the strategy selected is not of the experimental type. There are no experimental and control groups assigned at random prior to the collection of data. Moreover, there is no systematic introduction of an experimental variable. The strategy used is of the survey type. The data are all gathered at the same time and the control of variables is mainly done *expost facto*. The main advantage of this approach is to reduce the cost and time involved in the collection of the data.

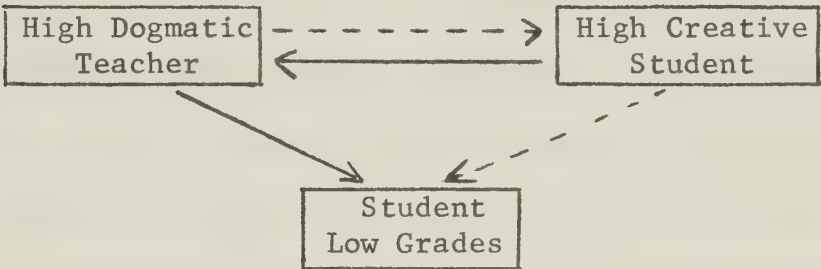
The 'internal validity' (Campbell, Stanley, 1963) of this strategy is limited by our lack of control over any spurious variables. It is in fact assumed that such spuriousness would not occur in a manner strong enough to reduce or to contradict the causal theory involved here. Judging from the data presented earlier on the close relationship between those elements of the school system, it was thought reasonable to assume the limited effect of any spurious variable. Essentially, the theory presented here states that the interaction between a particular teacher (high or low dogmatic) and a particular student (high or low creative) will produce a particular type of grade (high or low).



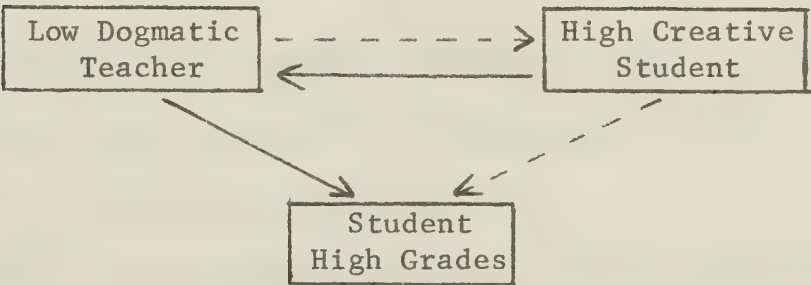


Given a situation where these teachers interact with high and low creative students and where these students are graded by these same teachers, we conclude that there must be a causal relationship if (1) there is an association between creativity and grades and (2) this association varies consistently among various categories of teachers. This theory can be represented by the causal models A and B<sup>1</sup>.

CAUSAL MODEL A



CAUSAL MODEL B



<sup>1</sup>It can be noted that the models  $HDT \rightarrow LCS \rightarrow S-HG$ ;  $LCS \rightarrow HDT \rightarrow S-HG$ ;  $LDT \rightarrow LCS \rightarrow S-LG$  and  $LCS \rightarrow LDT \rightarrow S-LG$  can be represented as logical models deriving from models A and B, but these additional models are not necessary to support the hypotheses.



The two causal models used here show two directions of interaction between the teachers and the students: one with hard lines and the other with dotted lines. It is most conceivable that in many instances one or the other is predominant, while in other instances, the two immediate causal factors (teacher's dogmatism and student's creativity) are of equal strength. The following illustrations show how each model represents the theory. The "lack of discipline" of a creative student might lead the teacher to a biased grading:  $HCS \rightarrow HDT \rightarrow S-LG$ ; the "dull teaching" of a teacher might lead the creative student to perform poorly on the examination:  $HDT \rightarrow HCS \rightarrow S-LG$ ; the "rigid grading system" used by the high dogmatic teacher might lead the creative student to perform poorly due to not meeting the "exact" requirements:  $HDT \rightarrow S-LG$  when HCS present; the low dogmatic teacher might want to reward the "additional effort" of the creative student:  $LDT \rightarrow S-HG$  when HCS present.

### III. SAMPLE

Consistent with the major hypothesis formulated above, a sample of junior high school students of average I.Q. (92-108) was selected. The criteria of selection were as follows:

1. One group was to come from the public school system and another from the separate school system (in order to include students which might have two different sets of values) (Herberg, 1955; Underwood, 1957; Feuer, 1963; Chambers, 1965; Datta, 1967).
2. The total sample was to be drawn from an 'average school', in order to enlarge the chances of obtaining the diversity of teachers needed. This was done by having each School Board select one school



among its most 'average'. As was reported by the representatives of both systems, the schools assigned were selected from the middle category on a continuum of traditional and progressive schools. Moreover, the two schools represented the middle-class category of the adult population (according to the School Board representatives).

3. Each school was to be in Edmonton in order to reduce the cost of the study, and yet still provide the opportunity of selecting from a large population of schools.
4. A series of classrooms were selected in each school in order to facilitate the administration of the instruments (i.e., in order to involve a smaller number of teachers and records).

This procedure provided us with two schools, A and B, where the following number of students were involved in each classroom:

TABLE III  
STUDENT DISTRIBUTION  
ACCORDING TO  
SCHOOL AND CLASSROOM

<u>School</u>	<u>Classroom</u>	<u>No. of Students</u>
A	1	7
	2	11
	3	13
B	4	7
	5	16
	6	8





In each school, a certain number of teachers was also selected. This selection was dependent upon the sole criterion of the course they taught to the students selected. Since courses in mathematics, science and social studies were selected, the respective teachers were involved.

TABLE IV  
TEACHER DISTRIBUTION  
ACCORDING TO  
SCHOOL AND CLASSROOM

<u>School</u>	<u>Classroom</u>	<u>Teacher's I.D. in Selected Courses</u>		
		<u>Science</u>	<u>Maths</u>	<u>Social Studies</u>
A	1	a	b	c
	2	a	b	c
	3	a	b	c
B	4	e	d	-
	5	f	g	-
	6	e	d	-

IV. SELECTION OF THE INSTRUMENTS

The rationale provided earlier (chapter III) helped us to select the instruments, but other criteria were also used. These additional criteria are presented here.

Various reasons led the author to select the Torrance Test of Creative Thinking to measure creativity. One reason why this particular test was selected was its widespread usage. In fact, according to Arasteh, "the most widely used test battery for assessing creativity in children are the Minnesota Tests of Creative Thinking" (Arasteh, 1968).



However, it should be noted that, from the battery of tests (3 Figural, 3 Verbal), only the Figural (Form A) tests were used, and this for two reasons: firstly, to reduce the amount of time required to fill in the test and secondly, because of the fact that the figural battery of tests is a measure more related to other measures of creativity (Stubbings, 1968:4496).

A very practical reason led the author to use the Canadian Lorge-Thorndike I.Q. test (Lorge et al, 1967) to judge 'intelligence'. This test is one of the most recognized measures of I.Q. in Edmonton, as the results of it are available in nearly all schools, including the ones under study.

The Rokeach Dogmatism Scale (Form E) was selected over the F-scale due mainly to its 'wider' application. Rokeach and his associates have in fact demonstrated that while the authoritarian 'left-of-center' subjects and authoritarian 'right-of-center' subjects both scored high on the D-scale, only the 'right-of-center' subjects scored high on the F-scale (Rokeach, 1960).

Grades in mathematics, science and social studies were selected as a measure of academic achievement. These courses were selected on the basis of 2 criteria. Firstly, they are core subjects. This means that in terms of the whole educational system, these courses are seen as 'important'. Secondly, these courses are most related to skills needed in our technological society. Low grades in these would most immediately characterize the student as either artistic as opposed to scientific (if he gets good grades in literature), or as lazy (if he



gets low grades elsewhere).

## V. DESCRIPTION OF THE INSTRUMENTS

Following is a brief description of the four instruments used in the study:

### 1. Torrance Tests of Creative Thinking

The figural tasks of the T.T.C.T. consist of three tests in two forms: A and B. The tasks are printed into two booklets which are self-administered.

Picture Construction Task: In both forms A and B, the subject is presented with a piece of colored paper (in form A, a pear shape; in form B, a jelly bean shape). There are two basic tasks: firstly, using this piece of paper as a 'base', the subject is asked to draw a picture that "no one else will think of" and which would refer to a story "as interesting and exciting as possible"; secondly, the subject is asked to compose a title or name for his drawing, which should be "as clever and unusual as possible".

Picture Completion Task: In both forms A and B, the subject is presented with a series of 10 sets of different lines. The task consists firstly, in completing these sets of lines into "interesting objects or pictures" that "no one else will think of" and to try to "make it tell a story as interesting and exciting as possible"; secondly, a title must be provided for each picture.





Repeated Figures Task: The subject is presented with 30 sets of parallel lines (Form A) and 40 circles (Form B). The task is exactly the same as mentioned in the first two.

<u>Name of Task</u>	<u>General Meaning of Task</u>
Picture Construction:	This task aims at testing the abilities of originality and elaboration. An effort is made to elicit an original response by asking subjects to try to think of something that no one else in the group will produce. Elaboration is encouraged by the instructions to add ideas that will make the picture tell as complete and as interesting a story as possible. This task "sets in motion the tendencies toward finding a purpose for something that has no definite purpose and to elaborate it in such a way that the purpose is achieved" (Torrance, 1968).
Picture Completion:	This task aims at the abilities of originality, elaboration, fluency and flexibility. "The incomplete figures create tension in the beholder, who must control this tension long enough to make the mental leap necessary to get away from the obvious and



<u>Name of Task</u>	<u>General Meaning of Task</u>
Picture Completion: (cont'd)	<p>commonplace. The invitation to "make the drawing tell a story is designed to motivate elaboration and the further filling in of gaps" (Torrance, 1968). The titles are scores for originality and cleverness. In general, this task "calls into play the tendency towards structuring and integrating".</p>
Repeated Figures:	<p>This test aims at fluency, flexibility, originality and elaboration. However, Form A (parallel lines) seems to stress originality more than Form B (circles), while the reverse is true for elaboration. "The closed figures task brings into play the tendency toward disruption of structure in order to create something new" (Torrance, 1968). The incomplete figures elicit the creative tendency to bring structure and completeness to whatever is incomplete. For both, "the repetition of a single stimulus requires an ability to return to the same stimulus again and again and perceive it in a different way" (Torrance, 1968).</p>



2. Canadian Lorge-Thorndike Intelligence Test

The Canadian Multi-Level Edition of the Lorge-Thorndike Intelligence Tests provides both a Verbal and Non-Verbal Battery for levels A-F (grades 3-9) in a single booklet.

The Verbal Battery is made up of five subtests which use only verbal items (vocabulary, verbal classification, sentence completion, arithmetic reasoning and verbal analogy). The Non-Verbal battery uses items which are either pictorial or numerical. It contains three subtests involving pictorial classification, pictorial analogy, and numerical relationships.

The C.L.-T.I.T. aims at providing information on the "student's ability to work with symbols, abstract ideas, and their relationships". It is viewed essentially as a measure of "academic ability".

One point to remember is that the batteries are classified according not only to grade level, but also according to the type of community or school in terms of socio-economic levels. In the case which concerns the researcher, the battery at Level E was employed:

<u>Battery Level</u>	<u>High Socio- Economic Community &amp; School</u>	<u>Average Socio- Economic Community &amp; School</u>	<u>Low Socio- Economic Community &amp; School</u>
C	grade 5	grades 5-6	grade 7
D	grade 6	grades 6-7	grade 8
E	grade 7	grades 7-8	grade 9
F	grades 8-9	grades 9-10	grade 10





### 3. Rokeach Dogmatism Scale

The D-scale, Form E (the latest) consists of 40 written statements to which the subject indicates how much he agrees or disagrees. (For all statements, agreement is scored as closed, and disagreement as open. The total score on the scale is the sum of scores obtained on all items). Since this is a self-administered test, the subject marks himself by circling one of six figures appearing in the margin and corresponding to a statement in the test. These figures are (+1) for 'I agree a little'; (+2) for 'I agree on the whole'; (+3) for 'I agree very much'; (-1) for 'I disagree a little'; (-2) for 'I disagree on the whole'; (-3) for 'I disagree very much'.

<u>Item No.</u>	<u>General Meaning of Items</u> <sup>2</sup>
1 - 4	The four items involve the "belief-disbelief dimension" (Rokeach, 1960). The first three consider the factor of "isolation within and between belief and disbelief systems" while the fourth considers the factor of "relative degrees of differentiation of the belief and the disbelief systems".
5 - 36	These 32 items involve the "central-peripheral dimension" (Rokeach, 1960). The first 13 items (5-17) consider the factor of "specific content of primitive beliefs" while the next 16 (18-33) consider the factor of "formal

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<sup>2</sup> It must be understood that each factor mentioned here can be further divided into 'cognitive aspects' or categories.



<u>Item No.</u>	<u>General Meaning of Items</u>
5 - 36	content of the intermediate belief region", and the remaining (34-36) consider the factor of "interrelations among primitive, intermediate, and peripheral beliefs".
37 - 40	These four items involve the "time-perspective dimension" (Rokeach, 1960). The first item (37) considers the factor of "attitude toward the past, present, and future". The other items (38-40) consider the factor of "knowing the future".

#### 4. Teachers' Grades

Grades were obtained by the author from the school records. They consisted of the grade-point average derived from the three major yearly examinations prior to the final examination.

#### VI. VALIDITY AND RELIABILITY OF THE TESTS USED

By means of introduction, the concepts of reliability and validity are examined.

Reliability generally refers to the variation in scores among individuals, due to inconsistencies in measurement. Three distinct methods are generally used to calculate the coefficient of reliability: 1) a retest with the same test; 2) the use of parallel test forms and 3) the subdivision of the test. In most cases, the procedures refer to either retesting the same individuals or testing similar individuals at the same time (Thorndike, Hagen, 1955; Selltiz et al, 1959).



Validity generally refers to the extent to which the performance on a test actually corresponds to the type or quality of behavior which is supposed to be measured. Four distinct methods or types of evidence are used to calculate the coefficient of validity: 1) Concurrent validity helps to distinguish individuals who differ in their present status; 2) Predictive validity helps to distinguish individuals who will differ in their future status; 3) Construct validity: when the predictions of the test are consistent with (other) predictions suggested by the theory and which the test is based on; 4) Content validity: when the skills, knowledge and understanding needed to fill in the test represent the behavioral process to be tested (Thorndike, Hagen, 1955; Selltiz et al, 1959) (see Appendix C for further elaboration).

A review of the literature on the Torrance Test of Creative Thinking shows that the test has high reliability scores (.90). In terms of validity, the test shows a generally accepted content, construct and concurrent validity. The results of studies regarding the predictive validity of the test are still awaited. Despite its weakness on predictive validity, the T.T.C.T. is generally recognized by its critics as a valuable tool for research (Holland, 1968b; Taylor, 1964; Thorndike, Hagen, 1955). Supportive evidence is presented in Appendix C.

A review of the literature on the Canadian Lorge-Thorndike Intelligence test shows that this test has a high level of reliability (.90). In terms of validity this I.Q. test showed adequate content, and construct validity, and yielded substantial positive results in



regard to pragmatic validity. Supportive evidence is provided in Appendix C.

The reliability scores for the Dogmatism Scale (form E) are quite high (around .80). In addition, the scale showed good content, construct and pragmatic validity in various studies. Supportive evidence is provided in Appendix C.

## VII. ADMINISTRATION OF THE INSTRUMENTS

The only two instruments which had to be administered were the creativity tests and the dogmatism scale. The collection of data related to teachers' grades and intelligence quotients was done through the available school records.

The dogmatism scale was the first instrument administered. The procedure was simple; principals of the two schools were contacted and they asked the teachers involved in the selected courses to complete the questionnaire. Great cooperation and discretion as to the object of the study was obtained from the principals and the teachers.

The creativity tests were administered by the researcher after the principal had made arrangements to select the students to be tested. These students were assembled into one classroom and the researcher gave them the instructions provided by Torrance in his "Directions Manual". The total time involved in administration of the tests was approximately 45 minutes. It should be noted that the test was administered according to the time limit allowed (10 minutes for each of the three tasks), as per instructions given by Torrance.





To summarize, a working hypothesis to be tested was presented and this hypothesis was integrated within a series of causal models. In addition, the characteristics of the sample used and of the measuring instruments were described and finally, the manner in which instruments were administered was reported.



## C H A P T E R   V

### ANALYSIS



## ANALYSIS

The analysis consists of two distinct phases: 1) the scoring or tabulating of the data and 2) the interrelating and interpreting of the results. These two phases are briefly described in this chapter. In doing so, the level of measurement of the data will be discussed.

### I. SCORING AND TABULATING THE DATA

Of the three types of data in which the author was interested (academic achievement, creativity and dogmatism), two (creativity and dogmatism) were of a qualitative nature. This meant that a particular method had to be used to quantify them. Such quantification was necessary in order to permit a statistical analysis. This type of analysis was decided upon in order to facilitate the interpretation of the study results.

To simplify the presentation of the data, the academic achievement scores (grades) are presented within the tables which show the students' creativity scores.

#### 1. Method related to dogmatism:

As indicated above, the D-scale consists of 40 items on which the subjects (the teachers) were asked to agree or disagree. To each item corresponds a scale ranging from -3 to +3, excluding 0 (in order to force disagreement or agreement) where the positive scores refer to agreements. The scale is subsequently converted to a 1 to 7 scale by adding a constant of 4 to each item score. "The total score is the sum of scores obtained on all items in the test" (Rokeach, 1960:87-88). Since for all statements 'agreements'





is scored as close-mindedness and 'disagreements' as open-mindedness, the individuals with high scores must be viewed as close-minded (Rokeach, 1960:73).

Using this technique, we obtained the D-scores for the teachers as indicated in Table V. A copy of the scale used is provided in Appendix A.

TABLE V  
TEACHERS' DOGMATISM SCORES

<u>Teacher</u>	<u>Score</u>
a	141
b	172
c	119
d	144
e	166
f	102
g	146

2. Method related to creativity:

The measurement of creativity was done mainly through comparison of the students' performance on the test with the standards established by the author of the test (Torrance). The subjects were asked to construct a picture, to complete a series of pictures around non-parallel lines and to complete a series of pictures around parallel lines. For each of these three tasks scores for originality and elaboration were given while scores for fluency and flexibility were given for the tasks of picture completion. Since a particular detail or picture is interpreted as a particular idea (Torrance,



1966:14-16), the type and number of details of a picture conditions the level of creativity of an individual on the four dimensions (fluency, flexibility, originality and elaboration).

Originality was determined according to the standards which are based on unusualness, i.e. constructing a cat from a peach-like form (as provided in the test) is more unusual than constructing an Easter egg. Elaboration was determined according to the details added to the picture already constructed, i.e. an eyebrow to a squirrel. Fluency was determined according to the rapidity in producing pictures: in fact, this score is based on the number of pictures completed in a limited amount of time. Flexibility was calculated on the basis of the number of different categories into which the pictures constructed fell into. For example, two pictures which fell into an 'aircraft' category gave 1 point, while 2 points were given if one picture fell into an 'aircraft' category and one into a 'body parts' category (the scoring guide provides 68 different categories which usually fit 99% of responses).

A different scoring method was used according to each of the three tasks performed. For example, the originality score on task 1 can vary from 0 to 5, while on task 2, the score can vary from 0 to 20, and on the third task, it can vary from 0 to 30.

All the scores were recorded on a 'scoring sheet' developed by Torrance (see example in Appendix B). The creativity 'score' from one individual then consists of 4 'scores' referring to the total points accumulated on the 4 dimensions of creativity as based on the performance of the 3 tasks.



It is important to note here that although one might tabulate a "composite" or total creativity score (T-score) "in general such practice is not recommended". As Torrance indicates, a subject may perform more in terms of one of the four dimensions and less in terms of another. For this reason, he explains, each creativity dimension of an individual should be considered as an entity and in relation with the others (Torrance, 1966:72-76). Each student's scores and grades are presented in Appendix D.

## II. INTERRELATIONS AND INTERPRETATION

The statistical data reported above can be interrelated in various ways, but if we consider the frame of reference developed in Chapters II and III, the ways to interrelate these data become limited. In fact, the frame of reference was summarized into three conceptual hypotheses to be tested. Consequently, it is in light of this that the data will be interrelated. Similarly, the interpretation of these results will borrow heavily on this frame of reference. The following presentation will consider each of these three hypotheses.

### (1) RE: The hypothesis that there is a statistical relationship between creativity and grades:

The best way to find out if a relationship exists between creativity and grades is to measure the degree of association between the two sets of data. Gamma was selected for four reasons<sup>1</sup>.

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<sup>1</sup> Firstly, creativity scores as well as academic scores do not necessarily have an interval level of measurement. In fact, interval measurement here would necessitate that the interval between categories of skills (creativity) and of knowledge (academic achievement) be the same. Not only is this difficult to 'prove', but in the case (cont'd on page 64)





This hypothesis can be supported in at least two ways. One way is to obtain a total association between creativity and grades, for all the students at hand. A second way is to obtain a series of associations between creativity and grades for categories of students. Both views are presented and discussed here.

- (a) Total Association: For each student the mean school grade was tabulated and ranked into categories of 5 points interval. This mean grade was then correlated with each score related to a creativity dimension. For each creativity dimension the following gammas were obtained:

<u>Fluency</u>	<u>Flexibility</u>	<u>Originality</u>	<u>Elaboration</u>
-0.04	-0.03	-0.12	-0.27

It can be concluded from these results that, as regards fluency and flexibility, there was no relationship between creativity and grades while the relationship was slightly negative for originality and substantially negative for elaboration. As a whole, these 4 associations

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of academic achievement no methodological precautions were even taken to ensure that this would be the case. Such precautions are extensively dealt with by Edwards (1957) and Torgerson (1958). Secondly, if we were to use a correlation coefficient such as the Pearson Correlation Coefficient ( $r$ ), a linear relationship detected through the scatter diagram must be assumed. Owing to the small number of cases involved in each classroom, the scatter diagram can hardly be indicative of a certain linear relationship. Thirdly, if we were to use such correlation coefficient as eta squared ( $E^2$ ) we would assume that one of the two variables is at the nominal level. The problem here is that this assumption would reduce the level of measurement of either one of the two variables. In fact, there is no doubt that when a teacher rates a student 75% instead of 73%, it is an indication that this student has more of the variable (knowledge) considered at 75 than at 73. Fourthly, gamma is, among the measures at the ordinal level (Somers' D's and Kendall's Tau abc), the one which provides the greatest reduction in error of predictions (Anderson, Zelditch, 1968:155).





represent a very low negative relationship between creativity and grades. The negative relationship obtained in the cases of originality and elaboration might be explained by the fact that most of the grades available were provided on subject-matters (science and mathematics) which could least "tolerate" originality and elaboration.

It is the author's contention that there can easily be a substantial relationship between creativity and grades if these two general variables are not considered as a whole (as shown above). The reason is that two contradictory associations of similar strength can produce a low or zero relationship, such as was obtained.

The above data definitely stress the necessity of examining the relation between creativity and grades within a particular context.

(b) Separate Associations: The categories of students which were selected to compute separate associations between creativity and grades were derived from a certain rationale. This rationale is essentially that there can be a certain interaction between the teacher and the students involved in his course, and that this interaction might influence the relationship between creativity and grades. In fact, it was shown (Maltzman et al, 1963; Hutchinson, 1967) that a teacher may, in his way of teaching, take into account the student's creativity and consequently produce, in the end, a positive relationship between creativity and grades. It was also indicated (Withall, Lewis, 1963) that 2 groups of students may interact so differently with the same teacher as to influence this teacher's performance. This reasoning led the



author to believe that the two variables of teacher and of classroom should be considered in an examination of the association between students' creativity and teachers' grades. Although each of these factors could be examined separately, a simple way to consider these factors was to take them both into account simultaneously. This could be done by examining each classroom (or group of students) and each course (taught by a different teacher). This is shown in Tables VI, VII, VIII, IX, X and XI.

TABLE VI

CLASSROOM 1 - DEGREE OF ASSOCIATION  
BETWEEN THREE SELECTED COURSES AND  
THE FOUR DIMENSIONS OF CREATIVITY

	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
<u>Math.</u> (r)	-0.400	-0.555	0.200	0.238
<u>Sci.</u> (r)	0.100	-0.111	0.300	0.523
<u>Soc.</u> (r)	-0.684	-0.647	-0.052	-0.200

TABLE VII

CLASSROOM 2 - DEGREE OF ASSOCIATION  
BETWEEN THREE SELECTED COURSES AND  
THE FOUR DIMENSIONS OF CREATIVITY

	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
<u>Math.</u> (r)	-0.360	-0.320	-0.428	-0.480
<u>Sci.</u> (r)	-0.320	-0.294	-0.200	-0.333
<u>Soc.</u> (r)	-0.384	-0.320	-0.307	-0.056



TABLE VIII

CLASSROOM 3 - DEGREE OF ASSOCIATION  
BETWEEN THREE SELECTED COURSES AND  
THE FOUR DIMENSIONS OF CREATIVITY

	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
<u>Math.</u> (✓)	-0.055	0.0	-0.013	0.267
<u>Sci.</u> (✓)	-0.123	0.164	-0.123	0.333
<u>Soc.</u> (✓)	-0.222	0.015	-0.305	0.323

TABLE IX

CLASSROOM 4 - DEGREE OF ASSOCIATION  
BETWEEN TWO SELECTED COURSES AND  
THE FOUR DIMENSIONS OF CREATIVITY

	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
<u>Math.</u> (✓)	-0.684	-0.333	-0.238	-0.809
<u>Sci.</u> (✓)	-0.111	-0.600	-0.300	-0.500

TABLE X

CLASSROOM 5 - DEGREE OF ASSOCIATION  
BETWEEN TWO SELECTED COURSES AND  
THE FOUR DIMENSIONS OF CREATIVITY

	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
<u>Math.</u> (✓)	-0.117	-0.148	-0.242	-0.017
<u>Sci.</u> (✓)	-0.132	-0.137	-0.292	0.008





TABLE XI  
CLASSROOM 6 - DEGREE OF ASSOCIATION  
BETWEEN TWO SELECTED COURSES AND  
THE FOUR DIMENSIONS OF CREATIVITY

	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
<u>Math.</u> (r)	-0.076	-0.040	-0.153	-0.230
<u>Sci.</u> (r)	0.478	0.454	0.545	0.217

It can be observed from Tables VI through XI that the measures of strength of association (gamma) vary a great deal: from -0.809 to +0.545. It can also be observed that the majority of these measures (39/60) are above or below  $\pm 0.20$  (28 negatives), indicating a substantially high relationship between creativity and grades. In fact, 9 measures are even equal to or greater than  $\pm 0.50$  (7 negatives).

As regards the general direction of the relationships between creativity and grades, it can be noted from Table XII that the majority of the associations obtained (44/60) were negative.

These findings clearly show that when courses and teachers are considered, there is a substantial negative relationship between creativity and grades. When the factors of teachers and courses are not taken into account, there is an association between creativity and grades only when creativity refers to originality and elaboration. In these two cases, the relationship is negative.



TABLE XII

NUMBER OF  
NEGATIVE, POSITIVE OR ZERO ASSOCIATIONS  
FOR EACH COURSE

(Maximum of 4 per Course)

	CLASS 1			CLASS 2			CLASS 3			CLASS 4		CLASS 5		CLASS 6	
	Math.	Sci.	Soc.	Math.	Sci.	Soc.	Math.	Sci.	Soc.	Math.	Sci.	Math.	Sci.	Math.	Sci.
NEG.	2	1	4	4	4	4	2	2	2	4	4	4	3	4	0
POS.	2	3	0	0	0	0	1	2	2	0	0	0	0	0	4
ZERO	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0



- (2) RE: The hypothesis that a positive relationship is obtained when the teacher is not dogmatic (1.A.) and the hypothesis that there is a negative relationship between creativity and grades when the teacher is dogmatic (1.B.):

In order to demonstrate the plausibility of these two hypotheses, the students' grades and the corresponding creativity scores were aggregated into three general categories. These categories were set up according to the degree of dogmatism demonstrated by the teachers on the D-Scale.

The teachers were divided into three categories -- highly dogmatic, moderately dogmatic and low dogmatic. This categorization was based on the 'normative' data provided by Rokeach (1960:90-91). In studying the reliability of his scale, he arrived at the conclusion that a D-score of around 140 could be considered an "average" score, while a score around 170 could be considered a "high" score. Since the scores of the teachers at hand ranged from 102 to 172, the teachers were divided into three categories, one in which the high dogmatic category would include the two teachers with scores of 166 and 172, the other in which the moderately dogmatic category would include the three teachers with scores of 141, 144 and 146, and the last in which the low dogmatic category would include the two teachers with scores of 102 and 119. Then, for each general category of grades and of creativity scores, a measure of association (gamma) was calculated. These results are summarized in Table XIII.

It can be observed in Table XIII that the results obtained generally contradict the two hypotheses. In regard to the first hypothesis, it can be noted that the general positive relationship expected



when the teacher is not dogmatic (or is low dogmatic) is not obtained for three of the four dimensions of creativity. On the contrary, one association is close to zero (-.07) and the two others are negative and substantially high (-.29, -.33). In regard to the second hypothesis, it can be noted that the general negative relationship expected when the teacher is highly dogmatic is not obtained for the four dimensions of creativity. On the contrary, the data show a substantial positive association (.31), a quite low negative association (-.13), and the two others are close to zero (-.07, .04).

TABLE XIII

ASSOCIATION (GAMMA) BETWEEN CREATIVITY AND GRADES  
CORRESPONDING TO COURSES WHERE THE TEACHERS ARE  
HIGHLY DOGMATIC, MODERATELY DOGMATIC AND LOW DOGMATIC

<u>DOGMATISM</u> <u>CATEGORIES</u>	<u>CREATIVITY</u>			
	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
High Dogmatic (166-172)	-0.079	-0.126	0.041	0.314
Moderate Dogmatic (141-146)	-0.142	-0.232	-0.046	0.424
Low Dogmatic (102-119)	-0.292	-0.335	-0.070	0.410

It should be noted that while there is a definite trend in the associations obtained between grades and fluency and flexibility, such a trend does not exist when originality is considered, and it is only partial when elaboration is taken into account. There is a near zero relationship for each of the three categories of teachers when





originality is associated with grades and the associations between elaboration and grades show a cell difference (of about .11) only under the high dogmatic teachers category.

The findings on the association between originality and grades tend to coincide with the findings obtained earlier when categories of teachers were not considered. In both instances the relationships were low and negative. This new finding adds to the evidence that originality is not highly related to grades. Also, this finding stresses the possibility stated earlier that this lack of relationship might be due to the course content (physics and science) on which the grades were provided. In any case, the findings obtained contradict the results expected on the basis of our hypothesis in that there is no difference between the teachers' categories.

In terms of "elaboration" the associations obtained do not support the hypothesis. The fact that a positive association was obtained for each category of teacher and the fact that there is no definite trend in the associations obtained (Table XIII) makes it difficult to argue that these associations are related to teachers' degree of dogmatism (as viewed in our hypotheses). Yet, the .11 difference obtained in one cell suggests that teachers' dogmatism is relevant here only when two categories of dogmatism are considered, i.e. high and low (including moderate). Since the substantially high associations obtained between elaboration and grades differ in direction from the association obtained earlier (when teachers were not considered) it is possible that a factor related to the interaction of the students and the teachers played a crucial role in the new



associations. Such a factor should be examined in future research but should not necessarily be related to creativity since elaboration is the least typical dimension of creativity (Torrance, 1966:72-74).

In terms of flexibility and fluency, the findings obtained in Table XIII contradict the two hypotheses (1.A. and 1.B.). In fact, the findings suggest that to the less dogmatic teachers will correspond the highest negative association between creativity and grades and to the most dogmatic teachers will correspond the lowest negative association between creativity and grades (if the association exists at all). The nature of these data lead to the conclusion that the two assumptions underlying our two hypotheses must be revised.

The revision of these two assumptions may be done in the context of the same theory from which the hypotheses were derived. Two assumptions were made (pp. 38-39). Firstly, it was assumed that the low dogmatic teacher would be 'open' to the creative student's ideas and approaches and would tend to encourage such ideas through various means, such as grading. Secondly, it was assumed that the highly dogmatic teacher's behavior would be the opposite of the low dogmatic teacher, and would consequently tend to penalize the creative students through various means which would be reflected in the grades.

On the basis of the 'open-mind' theory, it is possible to reformulate the first assumption. In view of this theory it may be assumed that the low dogmatic (open-minded) teacher is open to the ideas and to the approaches of the school system rather than those of the students. This approach might be more consonant with the teacher's behavior in the school context. If this assumption is accepted, and if



the nature of the school system, as described in Chapter II is taken into account, it can be concluded that conforming to the school system's rules would bring about the penalization of the creative student. This reasoning would explain why the low dogmatic teacher category shows negative association between creativity and grades.

On the basis of the 'closed mind' theory, it is possible to reformulate the second assumption. This assumption essentially meant that the highly dogmatic teacher would penalize the student because he would be 'closed' to the student's ideas. In terms of the progressive education ideology, such a teacher was viewed as a conservative. However, the closed mind theory does not apply only to this group of individuals (as was assumed in the hypothesis), but it may also apply to the so-called liberal. In terms of the school system, as previously described, it would be expected that the 'radical liberal' would be 'closed' to the school system's rules and values, but not necessarily to the creative student. This means that among a group of high dogmatic teachers, some might be considered radical liberal and others radical conservative. This idea is supported by the findings of Rokeach and Fruchter (1956), which show that "dogmatism is relatively independent of the left-right continuum". In other words, an individual can be dogmatic liberal or dogmatic conservative (the loading obtained between dogmatism and the liberalism-conservatism factor was .21).

It is plausible that there would be teachers who would not conform to the school rules and values, and consequently would support creativity in students and there would be those who accept the rules of the system and strictly abide by them. In terms of statistics, it means







that the associations between creativity and grades, where both types of teachers are found, would contradict each other and the total association would be near zero. Yet, individual teachers' association would show high positive and high negative associations. On the other hand, the low dogmatic teachers, being neutral and non-involved, would permit the elements of the school system to act negatively on the students. At this level of dogmatism, liberalism or conservatism would have little effect on the student and statistically, only similar negative associations would be expected.

TABLE XIV

ASSOCIATIONS CORRESPONDING TO EACH TEACHER

<u>TEACHER</u> (Dogmatism)	<u>CLASSROOM</u>	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
A (m.d.)	1	.100	-.111	.30	.52
	2	-.32	-.29	-.20	-.33
	3	-.12	.16	-.12	.33
B (h.d.)	1	-.40	-.55	.20	.24
	2	-.36	-.32	-.42	-.48
	3	-.05	.0	-.01	.26
C (l.d.)	1	-.68	-.64	-.05	-.20
	2	-.38	-.32	-.30	-.05
	3	-.22	.0	-.30	.32
D (m.d.)	4	-.68	-.33	-.24	-.81
	5	-.11	-.14	-.24	-.0
E (h.d.)	4	-.11	-.60	-.30	-.50
	5	-.11	-.14	-.24	-.0
F (l.d.)	5	-.13	-.13	-.29	.0
G (m.d.)	5	-.11	-.14	-.24	-.01



Unfortunately, for our demonstration, the data presented in Table XIV show a phenomenon which appears to contradict the meaning of the data in Table XIII and consequently the explanation which followed. In fact, while data in Table XIII indicate that, in terms of fluency and flexibility, there is a 'significant' difference between the categories of teachers, some data in Table XIV tend to show that there is no 'significant' difference among various categories of teachers. This is particularly true for classroom 5 (Table XIV) where the associations between creativity and grades are the same despite the different types of dogmatic teachers involved. However, this apparent contradiction may be explained. Because the individuals in each classroom were not derived at random from a larger group it is probable that the classrooms were different from one another. This situation may have introduced one or more spurious factors in the relationship between students' creativity and students' grades for differing levels of teachers' dogmatism. Since these other factors would more likely operate at the classroom level than in aggregate of classrooms, Table XIII should be viewed as more significant than Table XIV. In other words, Table XIII illustrates the importance of teachers' dogmatism while Table XIV illustrates the impact of factors other than dogmatism in the relationship between creativity and grades. Nevertheless, data in Table XIV stress that the evidence supporting the general hypothesis is weak.

These observations stress the interaction effect between a teacher and the classroom where he teaches (this includes the interaction between a particular teacher and a particular student). In



other words, although teachers' dogmatism seems to be a relevant factor in the relationship between creativity (fluency and flexibility) and grades, there are also other factors involved in this relationship. These other factors more or less produce exceptions (as noted in Table XIV) to the general conclusion elaborated above.

The following presents a series of plausible explanations in regard to the above-mentioned interactional factors.

In spite of the "progressive" ideology of a dogmatic liberal teacher, a high creative student might perform poorly for various reasons. The student might have had traumatic experiences within the school system at an early age (including experiences with dogmatic conservative teachers). The student might then associate these early experiences with all elements of the present school system (including his present teachers) without discriminating as to the possible differences (Ader, 1957; Secord, Backman, 1964; Taylor, J., 1956). Another case might be that of a student who displaces his frustrations from his parents to other forms of authority such as his teachers. The student might then aim at deceiving his teachers through low school performance (Amsel, Roussel, 1952; Murray, Berkum, 1955). A third case might be that of a highly creative student who is taught and graded by a low dogmatic teacher. Here, the student might perform well due to his above average achievement motivation acquired through his parents or other sources (Drews, Teahan, 1963; Brookover et al, 1967). A fourth case might refer to the fact that whether a teacher is dogmatic or not, his grading of a highly creative student might be biased by the classroom climate (Linton, 1955; Vroom, 1959). Similarly, a student





might not perform as expected due to the influence of his classmates (Gnagey, 1960; Siegell, Siegel, 1963).

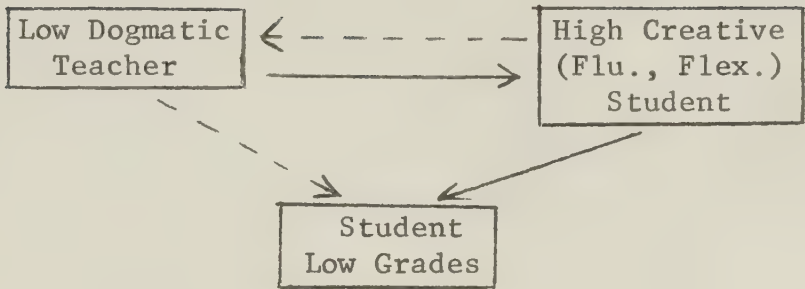
There are many social psychological factors which might explain the exceptions to our general findings regarding the relationship between creativity and grades as it relates to teachers' dogmatism. The above cases provide only a few examples.

The above analysis of the data related to the two hypotheses 1.A. and 1.B. leads to five conclusions. Firstly, the data as a whole do not support the hypotheses regarding the relationship between creativity and grades under the specified conditions of teachers' dogmatism. Secondly, when teachers' dogmatism is viewed as a factor interacting with students' creativity, originality is not related to grades. Thirdly, when teachers' dogmatism is viewed as a factor interacting with students' creativity, elaboration is substantially and positively related to grades. However, the relationship is affected by only one of three categories or levels of dogmatism. Fourthly, when teachers' dogmatism is viewed as a factor interacting with students' creativity, fluency and flexibility are substantially and negatively related to grades. However, it is important to note that this relationship varies with various levels of teachers' dogmatism: in fact, the less dogmatic the teacher, the higher the negative relationship between these two creativity dimensions and grades. This means that the Causal Model B (p. 45) suggested by the hypothesis 1.A. should be replaced by the following Causal Model C, and that the Causal Model A suggested (p. 45) by the hypothesis 1.B. should be replaced by the following Causal Model D.

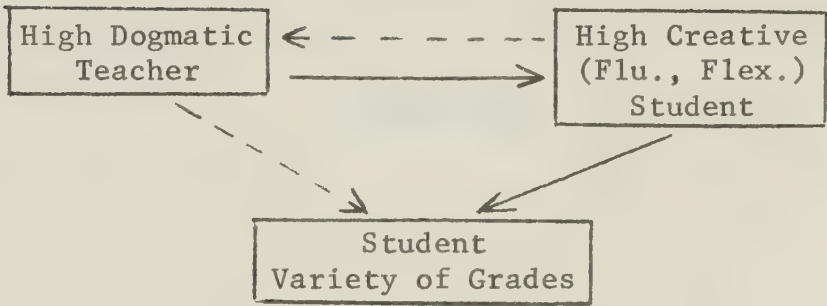




CAUSAL MODEL C



CAUSAL MODEL D



Finally, in studies such as this one, it is important to use observational techniques which would help to better understand the interaction between teachers and students at the classroom level.



## C H A P T E R   V I

### CONCLUSION



## CONCLUSION

The social problem inherent in the relationship between creativity and the school system lies in the fact that in discouraging the development of creativity in the school system, society reduces its capacity and its potential for optimal functioning. The graduates who take a part in shaping society's destiny are not as creative as they could be and the impact this has on society's functioning is reflected in the general inadequacy displayed in resolving problems.

This thesis presents the nature of a study where the relationship between creativity and grades is examined. This examination includes the study of the impact of the teacher's personality on the creativity-grades relationship.

The first finding shows that, as a whole, there exists a negative relationship between creativity and grades. Considering the literature on the types of associations obtained between creativity and grades this finding can be crucial. In fact, few studies which obtained a positive relationship between creativity and grades ever considered the possibility that the total relationship could be influenced by the students of above average I.Q. The present study shows that when the students obtain average scores (92-108) on the Canadian Lorge-Thorndike I.Q. test, the relationship between creativity and grades is negative. In practical terms, this finding suggests that the average I.Q. students might be those most 'penalized' by the present elements of the school system.

The second general finding of the study contradicts the hypotheses made regarding the role of the teacher's personality on the





above-mentioned relationship. It was assumed that high dogmatic teachers would be 'closed' to creative students' ideas and approaches and consequently, it was hypothesized that such teachers would bring about a high negative relationship between creativity and grades. The opposite was also hypothesized in the case of the low dogmatic teachers. However, it was found that when creativity referred to flexibility and fluency, a near zero relationship corresponded to the high dogmatic teachers and that a substantial negative relationship corresponded to the low dogmatic teachers.

This second finding suggested that the two assumptions which had led to the formulation of the related hypotheses were not correct. The first assumption consisted in considering dogmatism in terms of teachers' closed and open mindedness towards the students' attitudes and approaches. The second assumption consisted in considering the dogmatic teacher along a 'conservative' continuum. In reformulating these two assumptions within the context of the open and closed mind theory it was possible to account for the study's findings.

The first assumption was reformulated to consider the teacher's close and open mindedness in terms of the school system's rules and values. The second assumption was reformulated to consider dogmatism along two continuum: one conservative and the other liberal. This led to the conclusion that the high dogmatic teacher would not necessarily bring about a negative relationship between creativity and grades, unless he was of the conservative type (in terms of educational ideology). On the other hand, the low dogmatic teacher, being open-minded towards the school system, would, by definition, be 'conservative'.



As suggested by the literature on the nature of the school system, there are three major elements of this system which might be endorsed by the 'conservative' teacher. These are: 'content-oriented' examinations, 'subject-oriented' curriculum and 'teacher-oriented' method of instruction. The interaction of the teacher's personality (dogmatism) with these elements would determine whether the creative student would be 'penalized' or not through grades. Unfortunately, this study did not take into account the educational ideological orientation of the teachers involved. Such measurement, it is felt, is essential in any study related to the topic examined by the author.

The above interpretation of the study's results is congruent with Miller's findings, if some assumptions are made. In fact, if his high dogmatic teachers were highly conservative and if his schools were of the liberal type, the findings expected, according to this study's assumptions, are that the greater the teacher's dogmatism, the higher the negative relationship between creativity and grades.



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A P P E N D I X    A

OPINION AND BELIEF SCALE



APPENDIX AOPINION AND BELIEF SCALE

The following is a study of what the general public thinks and feels about a number of important social and personal questions. The best answer to each statement below is your personal opinion. We have tried to cover many different and opposing points of view; you may find yourself agreeing strongly with some of the statements, disagreeing just as strongly with others, and perhaps uncertain about others according to how much you agree or disagree with it.

Mark each statement on the answer sheet according to how much you agree or disagree with it (circle the number which corresponds to how you feel in each case). Please do not omit any statement.

+1: I AGREE A LITTLE

-1: I DISAGREE A LITTLE

+2: I AGREE ON THE WHOLE

-2: I DISAGREE ON THE WHOLE

+3: I AGREE VERY MUCH

-3: I DISAGREE VERY MUCH

- |              |  |
|--------------|--|
| -3-2-1+1+2+3 | 1. The United States and Russia have just about nothing in common.   |
| -3-2-1+1+3+3 | 2. The highest form of government is a democracy and the highest form of democracy is a government run by those who are most intelligent.                |
| -3-2-1+1+2+3 | 3. Even though freedom of speech for all groups is a worthwhile goal, it is unfortunately necessary to restrict the freedom of certain political groups. |
| -3-2-1+1+2+3 | 4. It is only natural that a person would have a much better acquaintance with ideas he believes in than with ideas he opposes.                          |
| -3-2-1+1+2+3 | 5. Man on his own is a helpless and miserable creature.  |
| -3-2-1+1+2+3 | 6. Fundamentally, the world we live in is a pretty lonesome place.   |



- 3-2-1+1+2+3    7. Most people just don't give a "damn" for others.
- 3-2-1+1+2+3    8. I'd like it if I could find someone who would tell me how to solve my personal problems.
- 3-2-1+1+2+3    9. It is only natural for a person to be rather fearful of the future.
- 3-2-1+1+2+3    10. There is so much to be done and so little time to do it in.
- 3-2-1+1+2+3    11. Once I get wound up in a heated discussion I just can't stop.
- 3-2-1+1+2+3    12. In a discussion I often find it necessary to repeat myself several times to make sure I am being understood.
- 3-2-1+1+2+3    13. In a heated discussion I generally become so absorbed in what I am going to say that I forget to listen to what the others are saying.
- 3-2-1+1+2+3    14. It is better to be a dead hero than to be a live coward.
- 3-2-1+1+2+3    15. While I don't like to admit this even to myself, my secret ambition is to become a great man, like Einstein, or Beethoven, or Shakespeare.
- 3-2-1+1+2+3    16. The main thing in life is for a person to want to do something important.
- 3-2-1+1+2+3    17. If given the chance I would do something of great benefit to the world.
- 3-2-1+1+2+3    18. In the history of mankind there have probably been just a handful of really great thinkers.
- 3-2-1+1+2+3    19. There are a number of people I have come to hate because of the things they stand for.
- 3-2-1+1+2+3    20. A man who does not believe in some great cause has not really lived.
- 3-2-1+1+2+3    21. It is only when a person devotes himself to an ideal or cause that life becomes meaningful.
- 3-2-1+1+2+3    22. Of all the different philosophies which exist in this world there is probably only one which is correct.





- 3-2-1+1+2+3 23. A person who gets enthusiastic about too many causes is likely to be a pretty "wishy-washy" sort of person.
- 3-2-1+1+2+3 24. To compromise with our political opponents is dangerous because it usually leads to the betrayal of our own side.
- 3-2-1+1+2+3 25. When it comes to differences of opinion in religion we must be careful not to compromise with those who believe differently from the way we do.
- 3-2-1+1+2+3 26. In times like these, a person must be pretty selfish if he considers primarily his own happiness.
- 3-2-1+1+2+3 27. The worst crime a person could commit is to attack publicly the people who believe in the same thing he does.
- 3-2-1+1+2+3 28. In times like these it is often necessary to be more on guard against ideas put out by people or groups in one's own camp than by those in the opposing camp.
- 3-2-1+1+2+3 29. A group which tolerates too much differences of opinion among its own members cannot exist for long.
- 3-2-1+1+2+3 30. There are two kinds of people in this world: those who are for the truth and those who are against the truth.
- 3-2-1+1+2+3 31. My blood boils whenever a person stubbornly refuses to admit he's wrong.
- 3-2-1+1+2+3 32. A person who thinks primarily of his own happiness is beneath contempt.
- 3-2-1+1+2+3 33. Most of the ideas which get printed nowadays aren't worth the paper they are printed on.
- 3-2-1+1+2+3 34. In this complicated world of ours the only way we can know what's going on is to rely on leaders or experts who can be trusted.
- 3-2-1+1+2+3 35. It is often desirable to reserve judgment about what's going on until one has had a chance to hear the opinions of those one respects.
- 3-2-1+1+2+3 36. In the long run the best way to live is to pick friends and associates whose tastes and beliefs are the same as one's own.



- 3-2-1+1+2+3 37. The present is all too often full of unhappiness.  
It is only the future that counts.
- 3-2-1+1+2+3 38. If a man is to accomplish his mission in life it is  
sometimes necessary to gamble "all or nothing at  
all".
- 3-2-1+1+2+3 39. Unfortunately, a good many people with whom I have  
discussed important social and moral problems don't  
really understand what's going on.
- 3-2-1+1+2+3 40. Most people just don't know what's good for them.



A P P E N D I X    B

SCORING WORKSHEET  
TORRANCE TESTS OF CREATIVE THINKING  
FIGURAL FORMS A and B



TORRANCE TESTS OF CREATIVE THINKING, FIGURAL FORMS A and B

Pupil's Name \_\_\_\_\_ Sex \_\_\_\_\_ Test Date \_\_\_\_\_

School \_\_\_\_\_ Age \_\_\_\_\_ Grade \_\_\_\_\_ Scorer \_\_\_\_\_

Form \_\_\_\_\_

Resp. No.	Activity 1		Activity 2			Activity 3		
	Orig.	Elab.	Categ.	Orig.	Elab.	Categ.	Orig.	Elab.
1								
2								
3								
4								
5								
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25								
26								
27								
28								
29								
30								

SCORE SUMMARY

	FLU	FLEX	ORIG	ELAB
Act. 1				
Act. 2				
Act. 3				
TOTAL				
T SCORE				

COMMENTS:





A P P E N D I X    C

THE RELIABILITY AND VALIDITY OF  
THE TORRANCE TESTS OF CREATIVE THINKING,  
THE CANADIAN LORGE-THORNDIKE INTELLIGENCE TEST AND  
THE ROKEACH DOGMATISM SCALE (FORM E)



APPENDIX C

THE RELIABILITY AND VALIDITY OF  
THE TORRANCE TESTS OF CREATIVE THINKING,  
THE CANADIAN LORGE-THORNDIKE INTELLIGENCE TEST AND  
THE ROKEACH DOGMATISM SCALE (FORM E)

Reliability and validity both refer to the quality of a measuring instrument. Reliability tells to what extent an instrument measures the same item, while validity tells to what extent an instrument in fact, measures what it is supposed to measure.

There are at least four ways to ascertain the reliability of an instrument: firstly, readministering the same instrument on different occasions; secondly, administering parallel instruments on different occasions; thirdly, administering the instrument once, subdividing the items in equivalent halves and calculating the Spearman-Brown Prophecy coefficient and, fourthly, administering the instrument once and calculating the Kuder-Richardson coefficient.

There are at least four ways to ascertain the validity of an instrument. A first way is when the instrument "looks valid" to the administrators and untrained observers; this is referred to as 'face validity' (Selltitz et al, 1959:165). A second way is when the content of the instrument systematically covers the content of the events or behavior to be measured; this is referred to as 'content validity' (Thorndike, Hagen, 1969:164-165). A third way is when the instrument permits to predict a specific future event or when it highly correlates with an "external criterion". For example, a test of creativity which highly correlates with the inventive production of a group of individuals has a high "pragmatic (either predictive or concurrent) validity"



(Thorndike, Hagen, 1969:166); Selltiz et al, 1959:157). A fourth way is when the instrument permits to differentiate the concept under study from others theoretically related. Also, it permits to predict a series of events which can be logically derived from the theory underlying the concept at hand (Thorndike, Hagen, 1969:175). There is no clear difference between pragmatic and construct validity in terms of the means used to arrive at them. The major difference between these two types of validity is that construct validity emphasizes the theoretical signification of the concept, while the other type is concerned with empirical correlations (Selltiz et al, 1959:163-164).

#### 1. TORRANCE TEST OF CREATIVE THINKING

##### Reliability:

One type of reliability which must be provided in the present case and which is, in fact, available, refers to inter and intrascorer reliability of scoring.

An experiment was conducted in which regular classroom teachers and educational secretaries scored tests without the benefit of any training other than the study of the scoring manuals. The results obtained indicate that "when the scoring guide is carefully studied and accepted", the coefficients of reliability for the various sub-tests are generally in excess of .90 (Torrance, 1966).

A second type of reliability which is available in the present case refers to: test-retest reliability. A list of studies indicating the coefficient of reliability for various population and forms or sections of the T.T.C.T. appears in Table XV.





TABLE XV  
STUDIES INDICATING COEFFICIENTS OF RELIABILITY  
FOR THE T.T.C.T. (FIGURAL)

<u>Studies</u> <sup>1</sup>	<u>Factors of Creativity:</u> <u>Sub-Tests and Total Battery</u>				
	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>	<u>Total</u>
1- Grover (1963) Sub-test (I.C.) Test-retest (1 week)	--	--	--	--	.69
2- Hagender (1966) Test-retest (2 weeks) 2 samples	.50 .80	.63 .64	.60 .64	.71 .80	-- --
3- Hagender (1966) Test-retest (8 months)	.71	.73	.85	.83	--
4- Mackler (1962) Sub-test (I.C.) 3 test-retests (every 2 weeks)	-- -- --	.72 .60 .63	.65 .62 .81	.47 .60 .57	-- -- --
5- Sommers (1961) 2 samples	-- --	-- --	-- --	-- --	.80 .97
6- Wodtke (1963) Test-retest (8 months) 3 samples	-- --	-- --	-- --	-- --	.34 .79
7- Yamamoto (1962) Sub-test (I.C.) Test-retest (10 weeks)	.76	.63	.79	--	--

<sup>1</sup> Torrance, 1966; Torrance, 1968; Torrance, 1967.



### Content Validity:

On the basis of Torrance's own statement (Torrance, 1966), this type of validity has been insured through the study of the lives of creative people, the nature of creative performances, the examination of the research and theories regarding the human mind. From this, Torrance has established a series of tasks which aim at revealing a creative product through the operation of a creative process or ability. This approach coincides with the author's definition of creativity "as a process through which difficulties, gaps in information, and incongruities are sensed and resolution of the resulting tension is sought through questioning, searching for additional information and new relationships, guessing or hypothesizing, testing these hypotheses, correcting them, and communicating the results." Consistent with this definition, the author has indicated his effort to keep the task tests free of technical or subject matter content (Torrance, 1967).

Referring to the 'biographical inventory technique', Schaefer (1967:1173) confirmed the value of the procedure used by Torrance: "It is apparent, he concluded to his study, that the biographical inventory technique can differentiate at a high significant level between adolescent boys who have displayed creativity and those who have not...".

### Pragmatic Validity:

This type of validity refers to both concurrent and predictive validity. In these two cases the 'test results' must corroborate with an accepted observation or criterion of what is to be measured. This



criterion can be of a present or future type. To this point, most criticisms have stressed the need for better 'external' criterion (Holland, 1968b; Moss, Duenck, 1967; Yamamoto, Frengel, 1966). Nevertheless, five types of 'pragmatic' evidence have been gathered by Torrance: peer nominations, teacher nomination, educational achievement, sales productivity and a follow-up study. Examples of these will be outlined briefly.

Yamamoto (1964) found a significant correlation (around .24) between the sociometric data obtained from 459 grade 7-12 students and five measures of creative abilities.

After a critical examination of the evidences pertaining to the relationship between 'teacher nominations' and the T.T.C.T., Vernon (1964) concluded that "by age 22 or so, good college tutors could give fairly good judgments" of a creative student's potentialities.

Torrance has recently presented (1967) a list of 65 coefficients of correlation between creativity scores and standard measures of academic achievement: the median obtained was .28. It must be noted that this median score was particularly lowered by 8 negative coefficients of correlation.

Wallace (1961) found a significant relationship in comparing the results of the T.T.C.T. and the productivity of 61 saleswomen. Similar findings were also made when he studied 223 salesmen a few years later (Wallace, 1964).

A follow-up study conducted by Erickson (1966) shows that over a six-year span the product-moment coefficients of correlation for four measures of creativity (fluency, flexibility, originality and





elaboration) and an index of creative achievement were statistically significant at .05 level of confidence.

#### Construct Validity:

One basic assumption made by the theory of creativity is that a creative personality or person is different from a non-creative one. Under the title of construct validity, Torrance (1966) has presented two sets of findings to confirm this assumption: a) the differences between the personality characteristics of those high and those low on the 'test' and b) the correlations obtained between various tests of mental ability or attitude. A second basic assumption made by the theory is that creativity is an ability and consequently can grow. A series of findings confirm this assumption and indicate the validity of the 'test' which can show a change resulting from creative influences or conditions.

One of the most recent and elaborate surveys of the personality characteristics of creative people as opposed to non-creative is perhaps the study by Daw (1965). In comparing two samples of senior high students of similar age, educational and socio-economic status, but where one sample was highly creative (T.T.C.T.) and the other was not, he found that the first were characterized by high experimental orientations, high intuitive orientations, high resistance to social pressures, low rules and tradition orientations, low needs for structure and directing and low passive compliance. They were also high on freedom, achievement, and recognition orientations. Seven similar and complementary studies have recently been presented by Torrance (1967).





Torrance has also presented numerous studies where it is shown that the T.T.C.T. reflects growth resulting from various kinds of creative experiences and facilitating conditions (Torrance, 1967).

All the studies referred to here involve students. However, Torrance has provided a series of studies referring to people outside the classroom.

2. CANADIAN LORGE-THORNDIKE INTELLIGENCE TEST

Reliability:

The odd-even reliability of the test as well as the correlation between the two batteries (verbal and non-verbal) have been obtained for a stratified random sample of 229 schools in all provinces of Canada from grade 3 through 9, including 31,739 students (excluding the N.W.T.).

The coefficient of reliability and the correlation between the two batteries is shown here for each grade:

<u>Grade</u>	<u>Verbal</u>	<u>Non-Verbal</u>	<u>Correlation</u>
			<u>Verbal Non-Verbal</u>
3	.945	.931	.681
4	.930	.930	.645
5	.915	.920	.659
6	.911	.911	.612
7	.872	.908	.605
8	.830	.897	.558
9	.867	.894	.613



### Content Validity:

The main assumption underlying the test is that a student's ability to work with symbols, abstract ideas, and their relationship is important in mastering the skills and understanding that make up a large part of the academic curricula at all levels of education. Consequently, according to the authors: "the items for the Lorge-Thorndike I.Q. tests were selected so that for the most part they deal with symbolic relationships. In answering most of the items a pupil is required to discover a principle and then apply it. The tests then, have been designed to measure reasoning ability" (Lorge et al, 1967).

### Construct Validity:

One way of establishing this type of validity is to determine the correlations between the present test with others which are designed to measure the same aptitude (in this case).

Although data for Canadian pupils have not yet been obtained (Lorge et al, 1967), experience with similar forms of the Lorge-Thorndike Tests in the U.S. indicates that the tests have a satisfying construct validity.

Lorge and Thorndike (1962) have presented the following correlations between the American test (verbal) and the Stanford-Binet and the Kuhlmann I.Q. tests: L.-B. (.79), K.-A. (.81). Between the California Mental Maturity (I.Q. tests), the Otis (I.Q. tests) and theirs, Lorge and Thorndike report the following coefficient of correlation according to different grade levels:



<u>Grade Level</u>	<u>C.M.M.</u>	<u>Otis</u>
4	.36	.22
5	.84	.64
6	.79	.78
7	.83	.85
8	.78	.86
9	--	.85
10	.79	.84
11	.83	.84
12	.77	.86
Median	.79	.84

#### Pragmatic Validity:

This type of validity tries to determine how accurately scores on the test predict important criteria such as school grades or performance on achievement tests.

According to Lorge and Thorndike (1962) the verbal scores on the American version and the scores on achievement tests correlated to the extent of .85 to .90. A typical case though is perhaps the one offered by Knief and Stroud (Ross, Stanley, 1954) where the Lorge-Thorndike was correlated with the Iowa Test of Basic Skills and yielded the following results: 1) Reading Comprehension (.776); 2) Vocabulary (.790); 3) Work-Study (.752); 4) Language (.726); 5) Arithmetic (.739); 6) Composite Battery (.839).

The results obtained with school grades are not as high as those obtained above but the correlations are still substantial and positive. Lorge and Thorndike (1962) showed the following coefficients between their test (verbal) and the average grades two years later: grade 7 (.56); grade 8 (.52); grade 9 (.59). The results were higher when





correlated with lower grades: grade 4 (.66); grade 5 (.76).

### 3. DOGMATISM SCALE

#### Reliability:

Very good results have been obtained on reliability tests performed either through the test-retest method or through the split-half method.

Rokeach himself (1960) has reported the following results for a series of participants:

	<u>Population</u>	<u>Method</u>	<u>Coefficient of Reliability</u>
a)	80 British College students	Split-Half	.81
b)	60 British workers	Split-Half	.78
c)	22 Ohio students	Split-Half	.85
d)	28 Ohio students	Split-Half	.74
e)	21 Ohio students	Split-Half	.74
f)	29 Ohio students	Split-Half	.68
g)	58 Ohio students	Test-Retest 5-6 months	.71
h)	89 Michigan students	Split-Half	.78
i)	80 Veterans	Test-Retest 1 month	.68
j)	24 Veterans	Test-Retest 1 month	.93
k)	17 Veterans	Test-Retest 1 month	.84



Three other studies have confirmed this high level of reliability. Troidahl (1963), using the split-half method and a sample of 227 Boston suburbanites, obtained a coefficient of .84. On a cross validation of a short-form of the D-Scale, Troidahl and Powell (1965) obtained a correlation of .94. More recently, Sawatsky and Zingle (1969) obtained a coefficient of .83 on a test-retest within 3 months interval.

#### Content Validity:

The statements of the D-Scale are deduced from Rokeach's theory of the open and closed systems of beliefs. According to this researcher "the statements are designed to tap the characteristics of these systems" (Rokeach, 1960).

The O.-C. systems of beliefs theory is based on three sets of data: one on authoritarianism, one on intolerance and one on systems of beliefs. The authoritarianism perspective of the O.-C. system of beliefs theory is based mainly on the writings of Fromm (1941) and Maslow (1943) on the authoritarian character structure and on the research project by Adorno, Frenkel-Brunswick, Levinson and Sanford (1950) on the "authoritarian personality". The intolerance perspective of the O.-C. system of beliefs theory is based mainly on the various studies by Frenkel-Brunswick (Fox, 1968:1477) on the "personality-centered" approaches to perception, by Mills (1951) on the middle-class thinking and by Katz and Braly (1952) on stereotyped thinking. The belief perspective is based mainly on various studies of single beliefs such as those by Bruner (1951), Krech and Crutchfield



(1948), on logical examinations (Black, 1946; Trueblood, 1942) and related studies (Rokeach, 1951; Witkins et al, 1954) on the concept of system and sub-systems of thinking.

From these data, Rokeach formed a "general, detailed statement of the defining characteristics" of a system of belief -- the first most general property being that the system can be "structurally" closed or open at various degrees. The second most general property of the system of belief is probably the assumption that "the extent to which a person's system is open or closed depends on... the extent to which the person can receive, evaluate, and act on relevant information received from the outside on its own intrinsic merits, unencumbered by irrelevant factors in the situation arising from within the person or from the outsider".

Rokeach operationalized such characteristics through a series of statements that "express ideas familiar to the average person in his every day life". Moreover, according to the author of the D-Scale, all statements were designed in order to avoid any specific ideological position and in order to stress the formal or structural aspect of a certain position. Consequently, as he explains, "persons adhering dogmatically to such diverse viewpoints as capitalism and communism, catholicism and anti-catholicism should all score together at one end of the continuum...".

#### Construct Validity:

The general hypothesis in Rokeach theory is that the more closed a person's belief system, the more resistance he will put to forming a





new belief system and the more open a person's belief system, the faster he will be able to integrate new beliefs into a new belief system. This cognitive process is mainly referred to by Rokeach and others as the "ability to synthesize". In using a test known as the Doodlebug Problem (where the 2 abilities of analysis and synthesis are dealt with into a problem-solving situation) Rokeach, McGovney and Denny (1955) significantly showed that those high on the D-Scale obtained a lower score on the problem-solving situation (I.Q. being constant).

In the same study, the three authors showed that although there is a correlation of .37 to .55 between the scores on the D-Scale and the scores on the Rigidity scale, the two refer to discriminable processes: dogmatism refers to the synthesis phase and rigidity refers to the analytical phase of the Doodlebug problem-solving situation.

A series of personality traits and cognitive characteristics coherent with Rokeach theory have been acknowledged by the use of the D-Scale. Rokeach and Vidulich (Rokeach, 1960), while testing a group of 60 sophomores on the Doodlebug Problem, found that low dogmatists took significantly less time to memorize the new parts of the problem to be integrated into a solution or belief system, and "enjoyed more" dealing with these. Rokeach, Swanson and Denny (Rokeach, 1960) tested 48 sophomores on a Chessboard Problem and inferred that the differences in dogmatism coincided directly with past experiences (as related to a new or old system). Rokeach, Oram, Laffey and Denny (Rokeach, 1960) found, among 40 students selected from a pool of over 600, that in "closed person;" the formation of new systems is facilitated when the





new beliefs are presented all at once but not when presented gradually. The authors explain: "the new do not have to be reconciled with old ones". In "open persons", the presentation makes no difference, except that they take longer than necessary when the beliefs are presented all at once. The authors explain: "they resist having new beliefs crammed down their throats without first working them through cognitively for themselves".

Two related experimentations by Mikol (Rokeach, 1960) indicated that although the low dogmatist and high dogmatist both accepted conventional music and composers, the high dogmatist differed from the low on unconventional music and their composers (age, I.Q. and musical background were not different). Rokeach and Bonnier (Rokeach, 1960) found, through testing subjects on T.A.T. cards, that the closed group used the future tense significantly more and the present significantly less than the open group. Content analysis further revealed a greater existence of threat themes and a greater need for closure in the stories told by the closed subjects.

Most of these results were confirmed by Rokeach and Fruchter (1956) in a factorial study. Through a factor analysis using 207 college students, they confirmed the following two hypotheses:

- a) dogmatism as conceived and measured is factorially discriminable from authoritarianism, ethnocentrism (intolerance) and rigidity;
- b) dogmatism, paranoia, and self-rejection would emerge together with anxiety, on a single factor.



After a brief analysis of the D-Scale, Bonjean et al concluded: "the dogmatism scale may be thought of as a general measure of authoritarianism, intolerance and close-mindedness" (1967).

Pragmatic Validity:

Significant results have been obtained through various studies, which may be interpreted as providing pragmatic validity to the D-Scale.

Rokeach (1960) reports that two groups selected by their peers as high dogmatic and low dogmatic (with no significant difference in age, education and I.Q.) significantly differed on the D-Scale with a coefficient of 56.1 (at .01). The two groups also significantly differed on the F-Scale (47.4) which is considered by Rokeach as a "specific measure of authoritarianism" and on the E-Scale (19.7) considered as a "specific measure of intolerance".

In another study by Rokeach (1960) where Catholic, Protestant and non-believers were selected on the basis of differences in ideology-structure (not content), the following correlations were obtained with the D-Scale, the F-Scale and the E-Scale:

<u>Scales</u>	<u>Catholic and Protestant</u>	<u>Catholic and Non-Believers</u>
D	11.0 (.01)	16.5 (.01)
F	10.6 (.01)	18.5 (.01)
E	4.3 (.05)	10.0 (.01)



Two recent studies tend to indicate that the D-Scale can predict: a) the strength of a person's belief-disbelief system and b) such personality variables as empathic accuracy. After having identified a group of low and high dogmatists on the D-Scale, Anderson (1969) found, through the Flanders method of Interaction Analysis, that both groups still differed despite the fact that they had been instructed in the method prior to the analysis. On the other hand, a study of counsellor trainees by Paley (1969) indicated that low dogmatists were significantly higher on the Empathic Accuracy Test than the high dogmatists as identified through the D-Scale.





A P P E N D I X    D

STUDENTS' SCORES IN MATHEMATICS, SCIENCE,  
SOCIAL STUDIES (WHEN APPLICABLE), FLUENCY,  
FLEXIBILITY, ORIGINALITY AND ELABORATION  
(for each classroom)



APPENDIX D

STUDENTS' SCORES IN MATHEMATICS, SCIENCE,  
SOCIAL STUDIES (WHEN APPLICABLE), FLUENCY,  
FLEXIBILITY, ORIGINALITY AND ELABORATION  
(for each classroom)

TABLE XVI

CLASSROOM 1 - STUDENTS' SCORES IN  
MATHEMATICS, SCIENCE, SOCIAL STUDIES,  
FLUENCY, FLEXIBILITY, ORIGINALITY AND ELABORATION

<u>Student</u>	<u>Math.</u>	<u>Sci.</u>	<u>Soc.</u>	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
1	67	58	69	21	15	28	64
2	63	68	66	24	17	19	107
3	52	65	53	28	18	26	72
4	65	75	68	23	17	31	93
5	57	57	56	23	19	19	33
6	59	71	71	22	17	22	49
7	60	61	69	14	13	16	37
Mean	60.42	65.00	64.57	22.14	16.57	23.00	65.00
Stand. Dev.	5.09	6.76	2.68	4.22	1.98	5.48	27.87



TABLE XVII  
CLASSROOM 2 - STUDENTS' SCORES IN  
MATHEMATICS, SCIENCE, SOCIAL STUDIES,  
FLUENCY, FLEXIBILITY, ORIGINALITY AND ELABORATION

<u>Student</u>	<u>Math.</u>	<u>Sci.</u>	<u>Soc.</u>	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
1	64	45	66	13	9	13	49
2	58	65	64	15	14	20	19
3	52	60	67	24	19	27	83
4	78	72	76	14	13	16	31
5	62	65	70	12	9	16	42
6	54	67	72	13	11	15	62
7	64	58	61	18	23	25	42
8	58	58	65	15	15	17	38
9	64	72	72	9	8	9	36
10	57	63	68	30	25	99	65
11	61	50	57	21	17	17	43
Mean	61.09	61.36	67.09	16.73	14.82	24.91	46.36
Stand. Dev.	6.93	8.42	1.62	6.10	5.71	25.09	17.76

TABLE XVIII  
CLASSROOM 3 - STUDENTS' SCORES IN  
MATHEMATICS, SCIENCE, SOCIAL STUDIES,  
FLUENCY, FLEXIBILITY, ORIGINALITY AND ELABORATION

<u>Student</u>	<u>Math.</u>	<u>Sci.</u>	<u>Soc.</u>	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
1	53	58	58	25	17	29	51
2	58	52	55	8	5	6	49
3	62	62	62	14	13	19	41
4	51	60	63	20	18	24	53
5	57	52	59	17	13	16	32
6	58	61	58	27	20	31	33
7	59	65	62	24	20	29	53
8	52	50	43	23	17	30	26
9	54	63	70	17	14	16	51
10	62	59	67	21	17	19	44
11	64	49	55	26	20	42	92
12	83	76	77	17	16	22	67
13	59	65	72	22	20	23	51
Mean	59.38	59.38	61.61	20.08	16.15	23.54	49.46
Stand. Dev.	8.15	7.47	2.41	5.38	4.22	8.96	16.78



TABLE XIX  
CLASSROOM 4 - STUDENTS' SCORES IN  
MATHEMATICS, SCIENCE, FLUENCY,  
FLEXIBILITY, ORIGINALITY AND ELABORATION

<u>Student</u>	<u>Math.</u>	<u>Sci.</u>	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
1	53	53	19	14	30	71
2	47	50	14	11	20	91
3	45	50	19	17	29	109
4	57	45	15	15	18	56
5	65	43	12	16	33	76
6	75	65	9	8	19	38
7	72	63	14	12	16	54
Mean	59.14	52.71	14.57	13.29	23.57	70.71
Stand. Dev.	11.84	8.42	3.59	3.15	6.85	24.05

TABLE XX  
CLASSROOM 5 - STUDENTS' SCORES IN  
MATHEMATICS, SCIENCE, FLUENCY,  
FLEXIBILITY, ORIGINALITY AND ELABORATION

<u>Student</u>	<u>Math.</u>	<u>Sci.</u>	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
1	50	37	20	16	19	106
2	55	47	12	8	8	99
3	85	82	22	16	30	99
4	80	62	10	9	13	57
5	62	57	13	9	19	91
6	47	42	19	16	23	94
7	42	28	8	7	17	53
8	55	48	14	13	17	75
9	65	50	12	11	21	78
10	50	45	16	12	22	62
11	70	53	18	14	16	81
12	67	50	17	13	13	75
13	55	35	18	14	30	70
14	68	53	8	6	16	54
15	58	40	15	9	24	108
16	32	35	18	17	26	85
Mean	58.81	47.75	15.00	11.88	19.63	80.44
Stand. Dev.	13.66	12.80	4.23	3.54	6.09	18.14





TABLE XXI  
CLASSROOM 6 - STUDENTS' SCORES IN  
MATHEMATICS, SCIENCE, FLUENCY,  
FLEXIBILITY, ORIGINALITY AND ELABORATION

<u>Student</u>	<u>Math.</u>	<u>Sci.</u>	<u>Flu.</u>	<u>Flex.</u>	<u>Orig.</u>	<u>Elab.</u>
1	57	40	13	10	13	77
2	78	45	28	20	23	98
3	53	40	13	10	12	84
4	60	40	17	12	20	77
5	32	43	35	21	20	71
6	53	48	22	15	38	138
7	72	45	19	15	14	35
8	18	43	23	16	39	101
Mean	52.88	43.00	21.25	14.88	22.38	85.13
Stand. Dev.	19.70	2.93	7.54	4.16	10.68	29.42

















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